ELECTRICAL REVIEW

Vol. CXLVIII No. 3827 30TH MARCH, 1951

THE OLDEST ELECTRICAL PAPER ● ESTABLISHED 1872

Circuit Breakers

CAPABILITIES OF BRITISH MANUFACTURERS

AT the British Electrical Power Convention last June, Mr. B. H. Leeson produced plenty of evidence to support his claim that British switchgear manufacturers are in a position to cater for any situation that is likely to arise whether at home or abroad. Further grounds for this claim were provided by Mr. A. T. Crawford in his lecture to the Electrical Power Engineers' Association which was reported in last week's issue.

Experience with Oil-filled Types

It is of basic importance that manufacturers here early recognized the merits of oil for quenching at current zero the arc formed on separating the contacts of a circuit breaker. They have thus had very many years of experience during which oil-filled designs with arc-control devices have been evolved to meet increasing voltages and rupturing capacities up to the highest values yet envisaged.

Significantly the demand for air-blast switchgear up to 33 kV sometimes made in the nineteen-thirties seems to have ceased. The objection was to the combustible nature of oil which, in certain exceptional instances, had aided the spreading of fires. No doubt the development of simple air-break switches for 415 V and 3·3 kV, with possible later extension of the range to 11 kV after further research into the construction of arc chutes, has removed some anxieties.

Thus in power stations, where a quantity of oil might be ignited by being spilt on to hot surfaces, the air-break type is being extensively used for the control of motors driving auxiliaries. We believe, however, that owners of factories, especially in dirty atmospheres, would be loath to forgo the advantages of oil-filled circuit breakers with their usually lower maintenance costs.

Air-blast Gear Performance

The scope of the air-blast type becomes more apparent as voltages are raised above 66 kV, but in non-residential areas noise on opening is a drawback. While restriking voltage transients present more of a problem with air blast than they do with oil, performance can be predicted. Equal voltage distribution is obtainable over multiple contacts and testing is practicable up to any voltage with individual units in tandem. The compressed air components have proved to be quite reliable. It seems probable that comparative overall costs, which depend on very variable local conditions rather than technical considerations,

will determine whether small-oil-volume or air-blast breakers will be used in any particular installation at very high voltages.

Since the cost of proved circuit breakers with high short-circuit ratings at any voltage influences considerably the layout of distribution systems, the tendency is to reduce their number to the minimum and to simplify design. Mr. Crawford's plea for the more general adoption of single busbars and non-phase separation in 33 kV tanks, for example, is justified by the record of switchgear reliability.

One valuable feature of the lecture was the opportunity it afforded for manufacturers' views to be fairly and comprehensively put before operation engineers, who in turn were able to suggest possible improvements with regard to maintenance and performance after a lapse of time. It was recognized that all engineering designs were based upon compromise—a kind of " resultant of forces "—and that frank and constructive criticisms by users were necessary aids to manufacturers in substantiating Mr. Leeson's claim.

TAX ON IMMERSERS

As Budget day draws near the electrical industry again wonders what will happen with regard to purchase tax. Year by year the electric water heater manufacturers have pressed for the reduction or remission of tax on their particular products and they were eventually successful in securing a lower rate on storage water heaters. But the tax on immersion heaters remains, quite unjustifiably, at 100 per cent. While there is certainly no hope of a general reduction in purchase tax, the Chancellor might give favourable consideration to immersion heaters when he is making adjustments as between the various classes. We reiterate that these appliances are neither luxuries nor peak increasers.

SCARCITY AND INFLATION

At the English Electric meeting last week Sir George Nelson commented on the soaring price of raw materials which, he said, was caused by governments creating world over-trading (largely by " stock piling "). Such a policy might be helpful if there were unemployment but it was disastrous in a world of full employment where labour was not immediately available to increase output in the fields where demands fell. Although the matter had gone so far strong action should be rapidly taken to ensure the proper distribution of materials at proper prices if the world was to be protected against inflation.

RATIO OF APPRENTICES

We were pleased to publish in our last issue a letter from a journeyman electrician demurring to our views on the use of apprentices and unskilled labour in the electrical contracting industry. He considered that we did not pay enough attention to quality of workmanship when we suggested that a proportion of one apprentice to five electricians was not big enough for the good of the industry. It is because we regard quality as of the first importance that we wish to see an adequate intake of likely boys into the industry. The Union's proposal would prevent this and the ultimate result could only be the employment of an undue number of semi-skilled adult mates which would not tend to raise installation standards.

SMALL GAS TURBINES

Small-capacity general-purpose gas turbines have not hitherto received the same attention as have the relatively large ratings to be installed for carrying peak loads in public electricity supply stations. Nevertheless the potential field for small sets should be considerable, especially in countries where oil is plentiful and water scarce. It will, no doubt, be very much greater when they can be run on residual oils, at present ruled out largely on account of the corrosive effect of vanadium at high temperatures. The tests on the novel and simple 750 kW turbine described by Mr. G. B. R. Feilden to the Diesel Engine Users' Association and reported in this issue, appear to be most promising. With distillate oil, compressor blade fouling did not present an important problem and there was no failure of major components.

RIVER DEE STATION

This week-end marks the end of the hydro-electric epoch at Chester. The small station on the River Dee, which was once capable of meeting half the electrical needs of the city and of the tramways (round about 1912), is being denuded of its plant which will be replaced by pumping machinery to supply five million gallons of water a day to the Capenhurst atomic energy establishment.

Blast Furnace Charging

Automatically Controlled Material Handling Plant

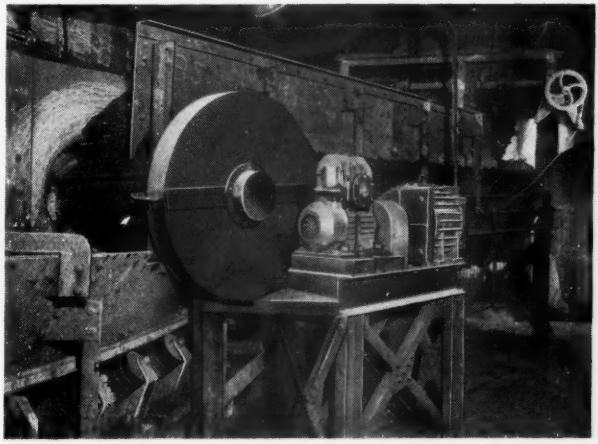
WHEN at the Rotherham works of the Park Gate Iron & Steel Co., Ltd., it recently became necessary to re-line the two blast furnaces the associated material handling and charging equipments and furnace tops were modified to allow a change-over from manual operation to mechanical handling with automatic electrical control. Before this reorganization took place the two blast furnaces together produced about 3,000 tons of iron a week, whereas 3,500 tons is now produced in the same time and with an infinitely higher degree of efficiency.

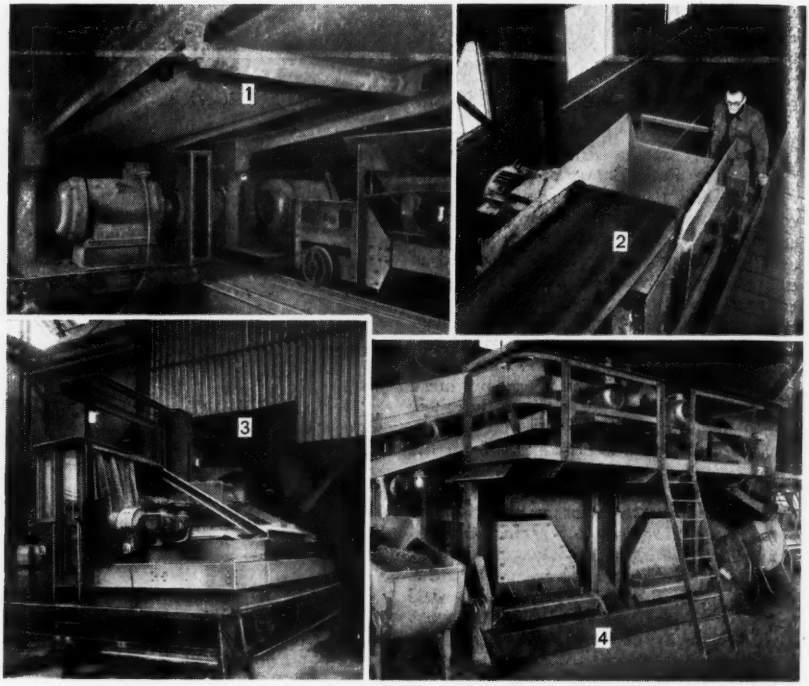
The ores used are principally from the company's own mines but the charges also contain a small proportion of richer foreign ores. The raw material is brought into the works by rail to two Strachan & Henshaw 20 ton " Rotaside " wagon tipplers, each of which is driven by a 25 h.p. d.c. motor and is equipped with two cast steel grids with 12in squares mounted above a 20 ton capacity hopper. The wagons are tipped through 150 deg, the ore falling on to the first grid. This grid can then be tilted at an angle of 70 deg, the necessary motive power being derived from a 10 h.p. d.c. motor, so that all oversize material falls forward on to the second grid where it is broken up by compressed air operated hammers.

The materials drop from the hoppers on to steel plate feeders below; these are driven through reduction gearing by 10 h.p. d.c. motors, the speed of which can be varied to suit the weight and type of material being handled. The ore then falls on to two parallel lines of 36in conveyor belts, one being 210ft long and the other 170ft

General view of blast furnace top

Materials from the wagon tippler hopper drop on to a feeder driven by a 10 h.p. d.c. motor





(1) Driven by two 40 h.p. a.c. motors these two conveyors take the materials to the top of the bunker building. (2) This 150ft shuttle conveyor delivers material into any one of the twenty furnace charging bunkers. (3) There are two of these scale cars which select material from the bunkers and deposit it in the furnace hoist skips. (4) Coke is separately treated in this automatic weighing and screening plant

long, which transport the material to another pair of 185ft long conveyor belts running at right angles to the first two. These four belts are each driven by 40 h.p. fixed speed three-phase high starting torque motors arranged for direct-on starting, as are all other a.c. motors in the plant, and take the material to the top of the bunker building where it is deposited on 16ft long shuttle conveyors. These are independent carriages incorporating a conveyor belt driven by a 5 h.p. a.c. motor, the arrangement being hand propelled along the track.

In the bunker building the conveyors discharge on to two further 150ft long shuttle conveyors with reversible belts, which run over the blast furnace charging bunkers. In each case the belts are driven by 10 h.p. a.c. machines and traverse is effected by 3 h.p. a.c. motors, power being supplied through a trailing cable from a cable reeling drum at the end of the building. By means of this comprehensive system material travelling along either of the conveyor lines from the wagon tipplers can be fed into any one of the twenty furnace charging bunkers. The capacity of this conveyor belt system is 250 tons of iron ore, or 115 tons of coke, an hour, which is more than is normally required. Thus a halt can be overtaken without reducing the driving of the blast furnaces.

There is only one man in control of the bunker building; he also has the entire sequence interlocked delivery mechanism under his control and is in communication with the wagon tippler operator by means of a "Loudaphone" installation. Once the control is set the whole combination of

operations proceeds automatically and in steps. As a safety precaution a trip cord is fitted alongside the fixed conveyor belts which, when pulled, will bring the entire plant to a standstill. The two plate feeders and eight conveyor belt installations, including the shuttle conveyors, were made by Richard Sutcliffe, Ltd., and F. H. Wheeler (Sheffield), Ltd., were responsible for the electrical installations on the conveyors.

The furnaces are also charged by mechanical means, thus eliminating the disagreeable aspects of the job. The range of charging bunkers beneath the two longer shuttle conveyors consists, for each furnace, of two coke bunkers with a total capacity of 12,900 cu ft and eight burden bunkers with a total capacity of 22,100 cu ft. The raw materials are taken from the range of bunkers by two scale cars, running on a track, which are fitted with pneumatically operated elevating forks riding up and down upon a steel mast. Each of these mobile units is propelled by a 20 h.p. d.c. machine and carries two air compressors each driven by a 10 h.p. d.c. motor; power supply is through an overhead trolley-wire system.

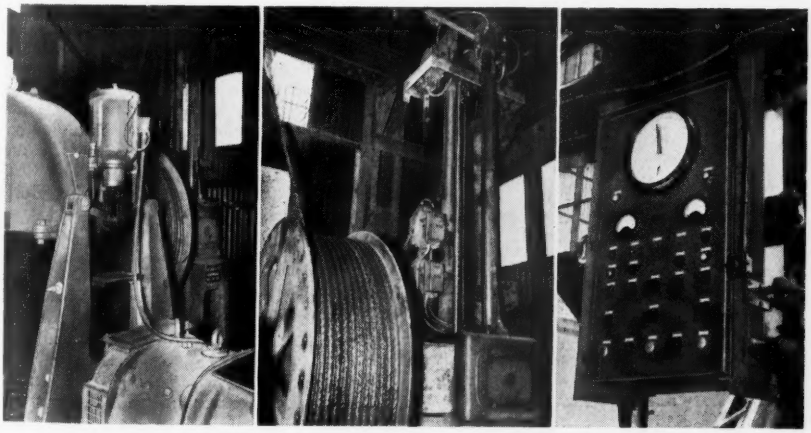
Under the control of the scale car operator the forks are engaged with handles on the bunker gates which, when lifted, allow the raw material to fall down into the 80 cu ft capacity scale hoppers. Here the ore is automatically weighed before the required amount is released into the blast furnace hoist skips below the track opposite each furnace. Coke is separately treated; it is gravity fed from the bunkers on to belt conveyors, passed over 1·25in screens into automatic weighing hoppers and thence into the skips. The material which passes through the screens is unsuitable for use in the blast furnace so it is deposited into railway trucks, taken away and sold.

The hoist runways are 140ft long from the charging point to the furnace top. There are two tracks for each furnace, so that while one skip is travelling to the top with a load the other is returning empty. In the case of each furnace this arrangement is driven by a 70 h.p. motor fitted with a magnetic brake, situated in the hoist house just outside the bunker building. Once started a skip is automatically accelerated, decelerated and brought to a standstill at the furnace top by means of limit switches arranged on a vertical column, which are operated progressively by screw-driven strikers.

To secure even distribution of charge in the furnace a revolving hopper is associated with the auxiliary bell at the furnace top. This is driven by a 15 h.p. d.c. motor and can be rotated throughout 360 deg in steps of 45 deg.

Each pair of skip deliveries is arranged at

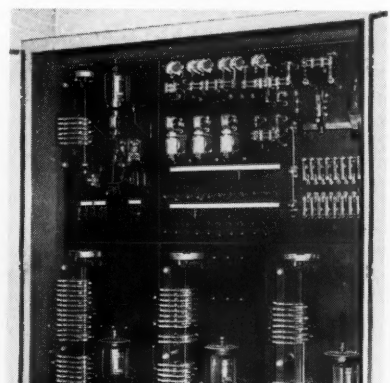
Left: **The skip hoist is driven by a 70 h.p. motor equipped with a magnetic brake.** *Centre:* **This screwgear and limit switch assembly automatically accelerates, decelerates and stops the skip hoist motor.** *Right:* **Control station in the scale car position**



180 deg to one another. The hopper then distributes the burden circumferentially. The distribution of any charge in the furnace is governed by the relation of skip-loads to the lowering of the auxiliary bell to deposit the burden on the main bell and the lowering of the latter bell to deposit its charge into the furnace.

Both the main and auxiliary bells are pneumatically operated through solenoid operated valves which are electrically interlocked so that in no circumstances can both bells be open at once. Furthermore, should either of them fail to seal again owing to some obstruction, automatic "jigging" takes place until that obstruction is removed. The sounding rods, which are raised by a 2 h.p. d.c. motor operated winch in the control gear house immediately below the skip hoist motor room, are normally in the furnace, but they must be withdrawn before the main bell can be opened. When in the furnace the movements of these rods are transmitted by means of "Selsyn" position transmitting gear to an 18in dial instrument at the control station in the scale car position. This instrument has two main pointers indicating the depth of the right and left sounding rods respectively, together with a third "visualizer" pointer indicating small movements of the right rod. Apart from the various controls, other instruments at the control station indicate the loads per round and the angular movement of the distributor hoppers. All hoisting and charging operations are under fully automatic control although means are provided for independent manual control of the main and auxiliary bells and the distributor. The sequence of charging operations can be pre-set in a variety of ways, to suit the blast furnace manager's requirements, by means of an elaborate and fully interlocked system of contactors and sequence controllers in the control gear house.

Furnace charging automatic sequence control equipment



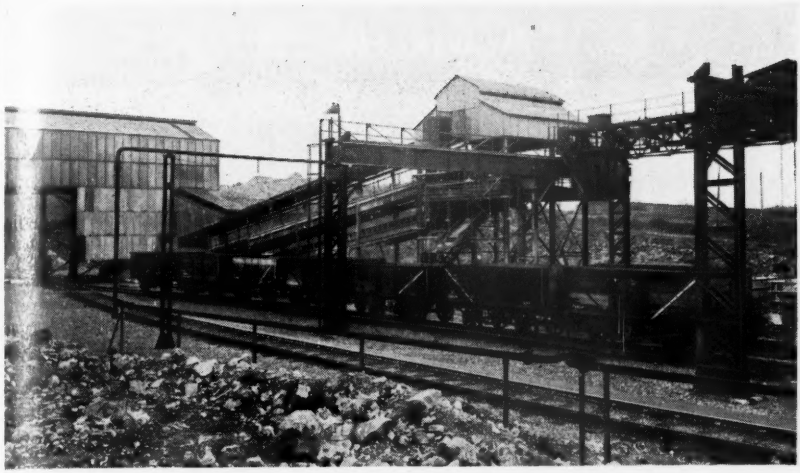
The whole of this equipment has been supplied by the Metropolitan-Vickers Electrical Co., Ltd., who also made the installations for No. 1 furnace. The gear for No. 2 furnace was installed by Lilleker Bros., Ltd., who also installed the lighting, etc.

In the main, the metal from the blast furnaces is used in the company's steel-making department, but all excess is cast into pigs in a fully mechanized pig casting plant recently installed near the works by Ashmore Benson, Pease & Co., Ltd. This machine is essentially a chain conveyor fitted with moulds. The molten metal is poured into the moulds at the lower end of the machine and is then elevated by the conveyor, passing under water sprays for cooling on the way. When the moulds reach the end of the conveyor the metal has solidified, so that as the conveyor turns underneath for the return journey the pigs drop into a chute and then into a 50 ton wagon where they are again sprayed with water.

When they are completely cool the pigs are transferred by an overhead 10 ton magnet crane supplied by John Smith (Keighley), Ltd., into railway wagons for despatch. The pig casting machine is also served by a 40 ton ladle crane with an auxiliary 10 ton hoist supplied by the Wellman Smith Owen Engineering Corporation, Ltd.

Power Supply

To cope with the additional load imposed by the new furnace charging equipment a new substation has been installed, which is fed from the works 3,300 V network and steps the voltage down to 440 V three-phase. All d.c. machines are fed from the existing



General view of the pig casting machine

220 V d.c. network, but the pig casting machine derives its 230 V d.c. power supply from a new 400 kW mercury-arc rectifier substations which has been erected near the machine. This is also fed from the 3,300 V network. The electrical equipment in the substations was supplied by the Metropolitan-Vickers Electrical Co., Ltd., and the British Thomson-Houston Co., Ltd.

Acknowledgment is due to the directors and officials of the Park Gate Iron & Steel Co., Ltd., for supplying details of the blast furnace charging equipment and for permission to publish this article.

RADIO INTERFERENCE

UNSCREENED industrial equipment operating at radio frequencies can cause serious interference with radio reception and the provision of efficient screening is usually essential. In a report (Ref.: M/T104) by J. Miedzinski and S. F. Pearce, which has just been published by the Electrical Research Association, Thorncroft Manor, Dorking Road, Leatherhead, Surrey, price 7s 6d, postage 3d, the performance of four simple screening rooms lent by Belling & Lee, Ltd., is explained and is related to the materials of which the rooms are constructed; perforated zinc sheets, electro-galvanized expanded steel, tinned iron mesh and galvanized iron wire netting.

It is shown that this design of screening room can provide a useful attenuation of the field radiated by the enclosed source of r.f. power, while the radiation pattern of the latter remains substantially unaltered by the presence of the screening room. Earthing has little or no effect on the attenuation.

The behaviour of the screening room is affected by the care taken in bonding the various sections so a reliable and simple method for bonding the door is needed. As good bonding is more readily obtained with a mesh than a perforated sheet a high attenuation is obtained more easily by double screening of inferior material than by single screening of superior material.

A formula derived for the attenuation due to a simple screen agrees closely with experiment and shows the dependence of the attenuation on frequency and on the geometrical and electrical properties of the material used. For a mesh the attenuation is due almost entirely to the room behaving as the shorted secondary of a transformer. Skin effect does not contribute to the attenuation but will in fact reduce it. High conductivity low permeability materials are best for a screen in the form of a mesh. A closer mesh gives better results at high frequencies.

VIEWS on the NEWS

By REFLECTOR

A READER in the Harlesden district tells me that he heartily agrees with my comments (16th March) on the useful record provided by the consumer's meter card. My correspondent says that the card supplied to him by the former Borough Electricity Department was filled up about a year ago and no attempt has been made to renew it. His wife ruled up a postcard as a substitute but she has to ask the meter reader to use it on each occasion and " he doesn't seem pleased." He has meant to apply for a new card all along but says he needed my paragraph to set him off. Once again I express the hope that the Electricity Boards will not deprive their consumers of this useful and inexpensive service.

* * *

A Lancashire paper complains about the way the recent increases in electricity charges were announced by the North Western Electricity Board; the writer says that the announcement employed " technical jargon." I think that the term is a little strong; all that happened was that the Board used the term " kWh " instead of " unit " and gave the new price as ·875d instead of ⅞d. All the same it is as well for the industry to remember that the majority of consumers are not familiar with quite common electrical terms and that (for some reason) they prefer vulgar fractions to decimals.

* * *

The first electric tramway in London would be celebrating its jubilee next week if it had survived. This was the London United Tramways system between Shepherds Bush and Acton and Shepherds Bush and Kew Bridge which was opened on 4th April, 1901, and widely extended up to 1907 when it was operating about 300 cars. Part of the system was acquired by the L.C.C. in 1922 and some other lines had been abandoned by the time the London Passenger Transport Board took over in 1933. The substitution of trolley-buses for tramcars had begun in 1931 and by 1935 the conversion was complete except on the Wimbledon Hill to Tooting section, and this went over to oil-bus operation quite recently. I suppose that few will regret that the last L.U.T. tram disappeared before the jubilee was reached, but the system served the London public well in its day.

* * *

After so much effort has been put in to persuade poultry keepers that electric light increases the egg output it was rather unkind of a member of the Tavistock Urba.. Council to complain that a street lamp near his fowl-house caused his hens to " go on strike." Another member pointed out that the contrary was really the case and that the complainant should be charged for the service.

* * *

Reading a report of a meeting of a section of the Electrical Power Engineers' Association I came across this passage:—

> " A lot of delay came from the National Joint Board calls for staff trees. Not until these multitudinous and arboreal efforts were presented by Board and Division (all fourteen of each sort) were the E.P.E.A. aware of the detailed offers. After this our own mills ground not a little. In fact the Joint Secretaries had to help some Boards with their proposals."

These must be the trees one cannot see the wood for. This view is confirmed by a later note that " part of the Board (London) trees is 109 pages long already."

* * *

I hear that the American General Electric Co. has decided not to enforce its rights in connection with its " weather making " patents. These patents cover methods of producing rain and snow by artificial means. It is unlikely that anybody in this country will wish to take advantage of the company's generous gesture. An extension of its beneficence to cover its artificial sunlight patents would be a different matter.

Electricity in 1851

Awards at the Great Exhibition

By G. J. S. KING

THERE are obvious differences between the Festival of Britain in 1951 and the Great Exhibition of 1851 which it commemorates, and perhaps the most striking is that whereas in 1951 electricity and everything appertaining thereto will be an essential feature in almost every facet of the Festival, the Britain of 1851 regarded it as the most amazing and incomprehensible of the many marvels in an exhibition of wonders.

Within the glass walls and under the glass roof of the Crystal Palace in Hyde Park all the wealth and industry of the world were displayed, and so impressive was this first of all international exhibitions that it was an outstanding landmark in nineteenth-century history. There was something of everything to be seen by people from everywhere. It is interesting to quote, from a contemporary account of the Exhibition, the attitude of mid-nineteenth-century Britain to the subject of electricity, expressed in the somewhat flamboyant phraseology of the period:—

> "Electricity—that power which, from its fearfully destructive force, was regarded as the manifestation of Almighty power, and which was placed as the emblem of might in the hands of the Olympian Jove—from which men still retreat in terror, has, by the force of human intelligence, directed in a philosophic spirit, been subdued to perform the most important tasks for man. Through space it passes, without note of time, to convey the expression of our thoughts and feelings. India by its means will soon be united with England, and the merchant, in London may instantaneously communicate with his agent in Calcutta, or the lover with his mistress. Thus, breaking through the barriers of distance, remote lands will be united together."

Already this dream was becoming a reality, with the linking of France and England by electric telegraph; and among the gold medals awarded by the jurors responsible for the Exhibition's recognition of merit was one to Siemens & Halske, for their part in that historic episode. The famous "chronometric governor" for steam engines by Sir William Siemens of that company also obtained a prize in the Exhibition.

The critic whose remarks have already been quoted developed the theme that the gathering of nations in a peaceful exhibition, and the development of electric communication, would result in the "production of order and the spread of peace"; and in amplification of this idea suggested that "those small instruments which are exhibited in the north-western gallery are world-embracing in their influences, and must assimilate more closely the thoughts of those nations which they may bring into communion."

Large Electric Clock

The electrical exhibits were not confined to the "Electricity Corner" in the north-western gallery to which reference has been made. There was, perhaps, nothing in the Exhibition more impressive than Shepherd's large electric clock in the transept, and contemporary writers were warmly appreciative of "the application of the subtle power of electricity to measure the tread of time." The clock was a thing of beauty as well as of utility, and it arrested the attention of all who approached the Exhibition from the south. Owen Jones, who was responsible for the aesthetic side of the Crystal Palace, had adapted Shepherd's contrivance to the external design of the building by arranging it in the form of a semi-circle, with a "VI" on both the east and west sides, and a second hour-hand. The hour-circle was 24ft in diameter, and the minute-hand, although shortened so as not to descend below the fanlight frame beneath, was 16ft long.

"The leading features in Mr. Shepherd's clock," said one account of the Exhibition, "are the application of the wonderful agent electricity to the winding-up of the impulse-spring or weight." It was kept in motion by eight powerful electro-magnets, and six of Smee's voltaic batteries were used, this battery having been devised by Alfred Smee

especially for Shepherd's clock. Besides this great clock in the transept there were auxiliary clocks at the east and west ends of the building, the current to which was transmitted " through copper wires coated with gutta-percha."

Alexander Bain, the pioneer of modern high-speed telegraphy, also contributed an electric clock to the Exhibition, and for his services to electric telegraphy he was awarded one of the coveted gold (Council) medals. This award, like that to Siemens & Halske, was made in Class X, which was devoted to " philosophical instruments," and it was significant of the realization of the authorities of the importance of new phenomena, that more of these rare awards were made in this group than in any other.

Telegraph Instruments

Bakewell's copying electric telegraph was another gold medal exhibit, and yet another was Brett's printing telegraph; the famous William Thomas Henley was similarly honoured for his " convenient and ingenious application of magnetic electricity to the purpose of electric telegraphs." Gold medals were allotted in the same group to L. J. Delguil " for his balance air-pump, and for the invention of an arrangement to keep the charcoal points in electric light at a constant distance "; W. M. Logeman, for the excellence of his magnets; Taurines, for a dynamometer; and Count Dunin, " for the extraordinary application of mechanism to his steel expanding figure of a man."

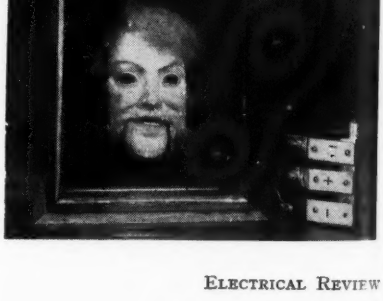
Few of the awards made in the Exhibition aroused such a storm of criticism as this distinction for the foreign count's " Man of Steel." It was comprised, it appears, of seven thousand pieces of steel, so arranged that by graduated movement the figure could be enlarged from stock size to the proportions of a Goliath. All critics were agreed as to the ingenuity of this mechanical toy, but there were acid comments at the variety of ways in which human ingenuity was too frequently diverted into unprofitable and impracticable channels; and there was even more trenchant criticism at the action of the Commissioners in allotting this gigantic trifle the highest award that it was in their power to give.

The " Man of Steel " merited equality, in the eyes of the jurors, with the work of J. Dubosq-Soleil, who was awarded a gold medal for " a very ingenious heliostat, on a new construction, by Silberman; the invention of an apparatus for fixing the charcoal points for electric light; a saccharometer of delicate structure and much ingenuity, and an elegant and novel instrument, by Brevais, for exhibiting the phenomena of polarized light." An omnibus award!

Several of the awards in the " philosophical instruments " class were for optical contrivances or photographic discoveries; and others were for atmospheric instruments, these including Vidie's invention of the aneroid barometer, and the atmospheric recorder of G. Dollond, which registered simultaneously the fall of rain, the direction and strength of the wind, the electric state of the air, etc. There were several magnetic instruments on view, and one commentator observed that " in the gallery of the Exhibition is an arrangement of the utmost ingenuity, in which the magnets are made to register their own movements."

One of these " very remarkable " groups of instruments, which were among the most striking evidences of science in the Great Exhibition, was another of the novelties which gave light relief. It took the form of a storm indicator, " in which leeches crawling out of the water, as is their habit when there is much free electricity, are made to ring bells." This is a reminder that in that fascinating gallery which contained so much of value in scientific achievement was Smith's " Comic Electric Telegraph," which the inventor modestly suggested might prove " an amusing and instructive addition to the ornaments of the drawing-room, as it might be used to illustrate the principle of magnetic induction."

Smith's electrically-operated animated head



This electrically-operated animated head will be on view at the Festival of Britain. G. A. Smith, the inventor, left it to his son, the late G. Eason Smith, who bequeathed it to the Bristol Savages, the city's club of artists and art lovers, whom he served as hon. secretary. Now it has been restored to working order. Three press keys on the remote control panel cause the head's mouth to open and close and its eyes to blink. The head will be accompanied by its original exhibition number and the bronze medal it won for Smith. It is recorded that Queen Victoria and the Prince Consort each pressed the keys to make it work and on this occasion Her Majesty was much amused.

Gutta Percha and Electro-plating

Council medals of direct or indirect electrical interest were not confined to the "philosophical instruments" class. There were, for example, three awards in Class XXVIII, which was concerned mainly with india rubber, among them being one to the Gutta Percha Company for the product associated with its name. And in Class XXIII there were Council medals for Elkington, Mason and Co., for "artistic application of the electrotype," and to A. Gueyton, for electro-plating. It was barely ten years since the art of plating by electricity had first been exhibited as a curiosity, but its application to useful purposes on the scale revealed by the Exhibition had not then been contemplated.

It will have been seen from the list of winners of Council medals that the demonstration of the power of electricity was by no means restricted to Britain. The electrical and magneto-electric apparatus from France was generally admitted to be excellent; and the electrotype of the Zollverein (the great commercial union in which the countries of Northern Germany were then linked) was impressive. An "electro-magnetic engine" from Denmark also attracted attention.

One other Council medal should not be forgotten. It was an award in Class VIII (Naval Architecture, etc.) to Sir William Snow Harris for "his system of lightning conductors attached to the masts and hulls of ships, which have been for several years in general use in the Navy, as a means of preserving life and property from the effects of lightning." His invention had already brought him a knighthood, and a grant of £5,000.

Although the prevailing mood in the Great Exhibition was one of intense optimism in the future of the human race—and 1851 Britain seemed to have made up its mind that permanent and universal peace was to result from this gathering together of the nations in friendly rivalry—some experts of the time seem to have been cautious as to the extent in which this new power could be harnessed to the service of man. One critic, in writing on the electrical aspect of the Exhibition, observed (and his caution was in marked contrast with the glowing phrases of the prophet quoted earlier in our survey):—

> "Although satisfied that, with our present knowledge of electrical forces, we can scarcely hope to adapt the electric light to any useful purpose, within the limits of any ordinary economy, or to apply electro-magnetism as a motive power; it is quite possible that we may, by a careful study of the primary laws of these forms of electrical force, arrive at new conditions which may enable us to apply them."

If one of the six-million-odd people who saw the wonders of the Great Exhibition in Hyde Park were able to inspect the 1951 Festival of Britain he would realize how those "electrical forces" which he saw in their fearful infancy, have developed to an extent that not even the most far-seeing of his generation deemed possible.

Long Transmission Span

THE Consolidated Mining & Smelting Co. of Canada is to extend its transmission lines from the company's plants on the Kootenay River, between Trail and Nelson, B.C., to those at Kimberley in the East Kootenays. The project, which will cost about $3,000,000, involves the construction of what is believed will be the longest overhead power line span in the world. This will carry the 170 kV 75,000 kVA transmission line across the main Kootenay Lake from a point between Ainsworth and Coffee Creek to south of Riondel. This span will be approximately two miles in length. Special suspension equipment and cables will be required. A branch line will also be built upon the east shore of Kootenay Lake to provide power for the company's Bluebell Mine, which is now being brought into production. The power line will proceed up Gray Creek over a 6,300ft pass, down Redding Creek and the St. Mary's River and will terminate close to the Sullivan concentrator at Kimberley. The power will be used for all the company's Kimberley operations, including a new fertilizer plant which will be built in the next two years.

Operating a 750 kW Gas Turbine

Report on a Year's Test

IN a paper presented before the Diesel Engine Users' Association on 15th March, Mr. G. B. R. Feilden reported on the practical aspects (including details of various difficulties encountered) of a twelve months' endurance test of a Ruston and Hornsby 750 kW gas turbine. Particulars of its design, which bears no close relationship to steam turbine technique, were given in the *Electrical Review* of 26th August, 1948, and further reference was made to it on 20th January, 1950.

The lecturer first listed the salient novel features of the set, which included a cooled stator with segmental shrouding for the compressor-driving turbine; two-stage overhung rotors for both compressor-driving and power turbines; ducting supports that permitted unrestricted thermal expansion; and four-to-one epicyclic reduction gear, combined with the power turbine, which was of very much less weight and size than other types. The only components requiring more than four hours for dismantling were the reduction gear and heat exchanger, the latter being supported from the turbine frame in a manner analogous to the condenser of a steam turbine. During the 1,100 hours of the test the thermal efficiency at full load was 23·4 per cent (0·59lb/b.h.p.) and 1·8 per cent at half load.

The fabric air filter, in a separate compartment ducted to the atmosphere, could be completely renewed for £16 16s, but the elements were capable of substantial further service. Dirt was deposited on the leading edges of the rotor blades of the axial-flow compressor up to a certain magnitude, after which particles were thrown off centrifugally. Compressor efficiency (84 per cent at full load) was reduced by slightly over 2 per cent and blade cleaning would probably be unnecessary for 5,000 hr. The original R.R.56 aluminium alloy blades had now been replaced by stainless steel.

Normal conversation could be easily carried on alongside the plant, Mr. Feilden said. Noise came equally from the reduction gear and from the air inlet, but was absent from the low-velocity exhaust duct. It could be further lessened by silencing the air intake. In future hardened and ground gears would be used for the planets as well as for the sun wheel. The tubular heat exchanger appeared to be self-cleaning from gummy deposits due to oil leakage, which did not affect its performance. Corrosion at the hot ends of the tubes, however, caused failure owing to initial absorption of atmospheric moisture by brazing flux residues.

Rotor and Stator Cooling

In consequence of trouble in matching the twin combustion chambers originally used, a single combustion chamber was to be fitted to future plants. The author held that cooling of the rotor components was essential when a gas turbine was started and stopped frequently. The plant described had been started 330 times and could be fully loaded in about six minutes. The stator of the compressor-driving turbine remained round to within 0·005in during the 1,100 hours, but that of the power turbine, although operating at a much lower gas temperature, was seriously distorted. In future sets a cooled stator, as used for the compressor-driving turbine, was to be employed since it was held that distortion was inevitable in split casings without prolonged preliminary warming up.

Lubricating oil had not appreciably deteriorated and should have a life of up to ten years (as for steam turbines) provided its temperature at any point did not exceed 170 deg F (77 deg C). A consumption of 6 oz/hr had been recorded. "Outages" of the plant had been due to minor components and not the compressor or turbines. One shut-down was caused by a defect in the heat exchanger. By far the greatest source of lost running time was the fuel atomizers, but this had now been cured.

Torch igniters with 10 kV spark gaps were quickly choked with carbon and were superseded by plugs with very solid electrodes fed from an 8 μF condenser charged by a transformer and rectifier to 3 kV.

In opening the discussion Sir Archibald Gill (president, I.E.E.) commended the frankness with which the author had discussed his various initial difficulties.

Industry and the House

Yorkshire Electricity Board's Offices

By F. J. ERROLL, M.A., A.M.I.E.E., M.P.

AN unexpected development in the matter of unauthorized building at Scarcroft Lodge for the Yorkshire Electricity Board robbed Parliament of what promised to be a thoroughly lively debate shortly before the Easter Recess. Mr. Kaberry, one of the Conservative M.P.s for Leeds, had raised on the adjournment the extensive building which had been going on at Scarcroft Lodge to provide luxurious new office accommodation for the Y.E.B.

The value of the work done had exceeded authorizations by over £40,000, and from the nature of the Minister's reply it seemed that, as only a " technical breach " of the regulation had been made, no further action was to be taken against the Board or its staff. This decision appeared to have all the elements of " one law for nationalized industry and one law for private industry " in it, and so an angry Opposition was getting ready to debate the matter in full.

The Attorney General, however, came to the House and in answer to questions stated that the allegations, which concerned authorizations by the Minister of Fuel and Power and not licensing in the ordinary way, were brought to his notice as a result of the adjournment debate. He had immediately directed that inquiries should be conducted into the matter by the Director of Public Prosecutions to see whether legal proceedings should be taken. The Attorney General added " The matter will proceed as an ordinary police investigation with such investigation of books as may be appropriate." In the circumstances the Opposition decided that a debate would not be appropriate, but the matter will certainly not be lost sight of.

Public interest in Parliament to-day centres almost wholly round the question of " Prayers," and as many trades and different branches of industry are often affected by these Prayers it is perhaps worth explaining the procedure in detail.

As a result of the growing practice of delegated legislation a number of Ministers may make Orders, or Statutory Instruments as they are now called, which have the full force of law. These Orders may deal with price control, rationing, control of labour, transportation matters, the pensions of employees in nationalized industries, the composition of a sausage, and a host of other subjects. Each Order must be laid before Parliament and, in most cases, a Member may object to it within a period of thirty-nine sitting days.

The procedure for objecting to a particular Order is to table a motion which invites the House to agree, " that an humble Address be presented to His Majesty, *praying* that the Order . . . (details of order) . . . , be annulled."

The King appoints his Ministers and constitutionally they act on his behalf when signing any Orders. The debate on an Order is thus called a Prayer and if the Opposition were to win such a debate it would constitute a minor, but important, defeat for the Government.

Debates on Orders have been going on for many years, but they have not hitherto attracted much attention because they are only taken after ordinary business has finished. Now, however, with the Opposition launching a big campaign against rising prices, the numerous Orders authorizing price increases have been prayed against night after night, thus producing a whole series of very late sittings.

The number of new Orders signed by Ministers has dropped remarkably in the last few weeks, and such has been the Opposition pressure that the President of the Board of Trade has announced that he will suspend discussions with trade associations on permitted price increases in view of the likelihood of the Opposition opposing them. This will cause some discomfiture to trade and industry, but some relief to the British consumer, at any rate temporarily.

PARLIAMENTARY NEWS

From Our Special Reporter

IN the House of Commons Mr. Langford-Holt asked the Postmaster General whether the membership of the Advisory Committee under he Wireless Telegraphy Act, 1949, was complete; how long after the passing of the Act the Committee was nominated; when its first and last meetings were held; and what advice it had given to him.

Mr. Hobson said that two Committees were set up on 26th July, 1950, to consider, in the one case, interference from the ignition systems of certain internal combustion engines, and, in the other, interference from refrigeration apparatus. They were complete in membership. The Committee considering ignition systems held its first meeting on 13th September, 1950, and its most recent one on 17th November, 1950; that for refrigeration apparatus met first on 14th September, 1950, and most recently on 26th February, 1951. Neither Committee was yet ready to make recommendations.

Mr. Langford-Holt asked if it were not incredible that these Committees, which were set up under an Act passed in 1949, and which first met in 1950, had still made no recommendations on such a simple problem? Mr. Hobson said he disagreed. It was not a simple pr oblem; it was a very difficult one. In view of the consultations which had to take place he could not agree that there had been undue delay.

Yorkshire Board Building

Mr. Kaberry asked the Attorney General whether his attention had been called to the admitted contravention of building regulations, Defence Regulation 56A, by the Yorkshire Electricity Board to an amount of at least £42,000; and what action he intended to take.

Sir Hartley Shawcross said that these allegations which concerned matters involving authorization by the Minister of Fuel and Power and not licensing by the Minister of Works, were brought to his notice by the reports of the debate on the adjournment on 6th March, and he immediately directed that inquiries should be conducted into the matter by the Director of Public Prosecutions with a view to the possibility of legal proceedings. The results of these inquiries would be reported to him in due course. The matter would proceed as an ordinary police investigation. Technically the preliminary inquiries were not *sub judice* but the House might consider the position was much the same. Inquiries were being made with a view to prosecution and in the light of the inquiries it might be difficult to discuss the matter with complete freedom.

Mr. Eden said he had consulted with some of his colleagues and they would not now raise the matter in the House on 20th March as projected.

B.E.A. Building Projects

Answering questions by Mr. Nabarro, the Minister of Fuel and Power (Mr. Noel-Baker) said that figures were not readily available of the value of authorized building work at present in progress, but during 1950 and 1951 he had authorized the fourteen Divisions of the British Electricity Authority and the fourteen Area Boards to proceed with 102 projects for new offices and administrative centres, and for structural alterations to existing offices and centres. The estimated cost of these projects amounted in all to £400,709. About 75 standards of softwood would be required, but as no licences were needed for steel, cement and bricks the figures of the quantities of these materials required were not available. These works had no priority, and would not, therefore, interfere with urgent work for the defence programme. He could not say to what extent the defence programme might make it necessary to defer them.

Mr. Nabarro asked if, in view of the considerable building resources that were being devoted to building these electricity offices, the Minister would now consider diverting these materials to building houses instead of palaces for bureaucrats.

Mr. Noel-Baker replied that these buildings for the electricity industry, with its immense scale of new development and rapidly expanding supply, amounted to only 0·02 per cent of the building of the country.

Decorative and Shop Lighting

The Minister of Fuel and Power stated in reply to a question in the House of Commons on 22nd March that although the supplies of coal had greatly improved, it was still necessary to make every practicable economy in its use, in order to start the building of summer stocks. For that reason, he proposed that the Order prohibiting the lighting of shop windows and advertisements should continue in force until 15th April, when Summer Time commenced.

Illuminations provided by local authorities of holiday resorts, however, consumed much less coal and he had come to the conclusion that it would be reasonable and right for these authorities to switch on their illuminations for three hours each evening on Saturday, Sunday and Monday of the Easter holiday.

PERSONAL and SOCIAL

News of Men and Women of the Industry

AT the end of this month **Mr. A. E. Mills,** commercial manager of M.K. Electric, Ltd., is retiring from that position but will continue as an executive director and has been appointed commercial adviser to the company. Mr. Mills entered the electrical accessory industry more than forty years ago, and joined M.K. Electric, Ltd., in 1927 as sales manager. He has for many years taken an active part in trade association matters, and is a past chairman of the Electrical Accessories Section of B.E.A.M.A. He is a member of various committees of B.E.A.M.A. and A.M.E.W.A. and of an Electrical Industry Committee of the B.S.I. Mr. Mills is also a member of the Incorporated Sales Managers' Association and of the Institute of Export. **Mr. H. P. Sale** has been appointed sales manager as from 1st April.

Mr. A. Apps, managing director of S. W. Bligh, Ltd., has been elected chairman of the East Kent Branch of the Electrical Contractors' Association for the fifth successive year.

In last week's issue we reported the speeches at the annual dinner of the **Electrical Wholesalers' Federation.** We now reproduce a photograph of the president, Mr. J. M. Hollander, the vice-president Mr. W. J. Bensley and the director Mr. A. B. Wildsmith with some of the principal guests. The Federation as a whole and its individual members are very active supporters of the Electrical Industries Benevolent Association. During the annual general meeting a sum of £105 was collected for the E.I.B.A.

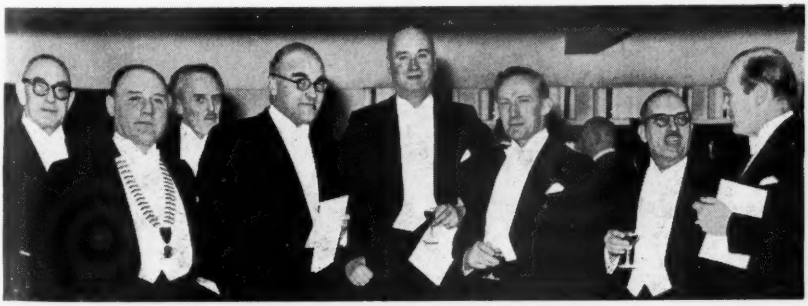
Mr. F. Gartside has been appointed manager of the Manchester branch of W. T. Henley's Telegraph Works Co., Ltd., as from 8th March. He succeeds **Mr. R. H. West,** who has retired from this position, having reached the age limit. Mr. West's services are being retained in a part-time capacity in connection with the branch business of the company.

Mr. F. Gartside

Mr. G. Sewell, A.M.I.Mech.E., chief mechanical engineer of Hopkinsons, Ltd., has been appointed to the board of the company.

Mr. J. Eerdmans has been appointed joint managing director of Thomas De La Rue & Co., Ltd.

Mr. W. Yorke, M.I.Mech.E., M.I.E.E., is retiring from the position of chief engineer to British Celanese, Ltd., after 33 years' service. In his younger days Mr. Yorke was associated



Officers and Guests at the Wholesalers' Dinner

Left to right: Mr. W. J. Bensley, Mr. J. M. Hollander, Mr. A. B. Wildsmith, the Earl of Verulam (chairman, Enfield Cables, Ltd.), Sir Henry Self (chairman, British Electrical Power Convention), Mr. E. R. Wilkinson (chairman, E.D.A.), Sir Vincent de Ferranti and the Hon. J. R. Rea (secretary, B.E.A.M.A.)

with the London Underground during electrification of the old District Railway and the construction of Lots Road generating station. Later he held appointments with the Manchester and Sunderland Corporations under the late Sir Leonard Pearce and the late Mr. A. S. Blackman respectively. After a brief holiday Mr. Yorke will take up consultative work.

Mr. Harold Hunt, M.Brit.I.R.E., has been appointed chief of development and engineering to E. K. Cole, Ltd., and will be responsible to Mr. A. W. Martin, M.B.E., chief engineer. Mr. Hunt received his training with A. Reyrolle & Co., Ltd., and after a period of three years in the technical and research laboratories, joined the H.M.V. Company. He has been with E. K. Cole since 1931.

Mr. H. Hunt

Mr. K. Haywood has rejoined Smart & Brown (Engineers), Ltd., as head of the Technical Sales Department. He will operate from 30, Ashley Place, Victoria Street, London, S.W.1. Before this appointment Mr. Haywood was a member of the Illuminating Engineering Department of Siemens Electric Lamps and Supplies, Ltd.

The members of the Radio Wholesalers' Federation, in response to an appeal by the president, Mr. F. K. Smith, have made a special contribution of £123 to the **Electrical Industries Benevolent Association** in memory of the late Mr. A. G. Beaver, an early president of the Federation and a lifelong friend to the E.I.B.A.

The annual ball of the Tees-side Branch of the Electrical Industries Benevolent Association was held recently in the Town Hall, Middlesbrough. The Ball was organized by the Tees-side Committee of the E.I.B.A. under the chairmanship of Mr. S. Tillotson, the manager of the Tees Sub-Area of the North Eastern Electricity Board. The result exceeded all previous efforts and enabled the sum of £244 to be forwarded to headquarters.

About 150 attended the annual dinner and dance of the cricket and football sections of the **Telcon Social and Athletic Club** (Telegraph Construction & Maintenance Co., Ltd.), which was held in the pavilion of the company's sports ground at Kidbrooke on 17th March. Among those present were Mr. J. N. Dean, managing director of Telcon, who was accompanied by Mrs. Dean; Mr. F. Leighton, works manager and president of the club; Mr. C. A. Abraham, treasurer, and Mrs. Abraham; Mr. Letton, secretary, and Mrs. Letton. Dr. G. A. V. Sowter, chairman of the club's general purposes committee, welcomed the guests. Mr. Abraham proposed the toast to the cricket section, Mr. W. J. Lillie, captain of the cricket first eleven, responding. The toast to the football section was proposed by Mr. C. Rudd, Mr. Hogan responding.

Mr. A. B. Hitch, A.M.I.Mech.E., has been appointed to the staff of Brookhirst-Igranic (S.A.) Pty., Ltd., the newly-formed company which will promote the interests of Brookhirst Switchgear, Ltd., and the Igranic Electric Co., Ltd., in South Africa. Mr. Hitch, who had been at the Brookhirst London office for several years, left for Johannesburg early in March.

Mr. C. H. Foster, who has been engaged in technical press advertising for the General Electric Co., Ltd., has joined the newly formed agency, Marshall Green, Ltd.

Mr. A. C. H. Frost, A.M.I.E.E., is leaving for Sydney on 5th April where he is taking up an appointment with the Snowy Mountains Hydro-Electric Authority. Mr. Frost, who was educated at Bournemouth and University College, London, has been with Messrs. Merz and McLellan for the last 15 years. Since the war he has been responsible for the electrical design of several power stations for the North of Scotland Hydro-Electric Board, and recently presented a paper to the I.E.E., with Mr. W. Brittlebank, on "The Control of Hydro-Electric Plant."

Mr. A. C. H. Frost

A pleasant evening was spent by members of the staff and friends at the social club dance of the **Sloan Electrical Co., Ltd.,** which was held at the Royal Hotel, Russell Square, London, W.C.1, on 16th March. Dancing was to the music of Stan Bond and his Blue Rhythmics.

OBITUARY

Mr. T. N. Veitch, joint managing director of Hague & McKenzie, Ltd., for the past twenty-one years, died on 16th March.

Mr. W. J. Burrows.—The death occurred suddenly at his office on 15th March of Mr. William John Burrows, managing director of the Stevenage Electrical Engineering Co.,

Ltd. and of Electrical Supplies (Stevenage), Ltd. He was sixty years of age. Before forming the Stevenage companies Mr. Burrows was with the Northmet Power Co. for twenty-one years.

Mr. **Joseph Meech**, A.M.I.E.E., chairman, joint managing director and founder of Meech Electric Drives, Ltd., and chairman and founder of Burdette & Co., Ltd., died in Harley Street Nursing Home, W.1, on 17th March.

Mr. **G. F. Mansbridge.**—The death occurred on 23rd March of Mr. George Frederick Mansbridge, O.B.E., M.I.E.E., at his home at Northwood, Middlesex. Mr. Mansbridge, whose name was a household word in the electric condenser industry, took out his first patent in 1899. He was connected with the Dubilier Condenser Co. for many years until he retired from the board of the company in 1949.

Mr. Alan Wright, a former director of Best Products, Ltd., Felixstowe, died on 8th March in a nursing home in Johannesburg. Mr. Wright went to South Africa in October, 1947, and founded the company of Wright Distributors (Pty.), Ltd.

Colonel A. E. Le Rossignol.—The death occurred on 21st March at Farnham, Surrey, of Colonel Alfred Ernest Le Rossignol, C.B., M.Inst.C.E., M.I.E.E.

Lighting Fittings Manufacturers

Annual Meeting and Luncheon

ABOUT ninety members and guests attended the annual luncheon of the Electric Light Fittings Association at the Piccadilly Hotel, London, on 21st March when the chair was taken by Mr. K. Scott Adie, the president.

Mr. T. W. Heather (G.E.C.), in proposing the toast of the Association, mentioned that it was " born " twenty-five years ago in much happier times when there were no controls, no import and export licences, no purchase tax and no Monopolies Commission. He believed that in the matter of lighting fittings there was no distinct British " school," but that might be explained by the fact that much of the industry's products was exported and had to meet customers' particular requirements. Nevertheless British craftsmanship and quality remained high. In street lighting British manufacturers had always led the world. The Association had done much to make the industry one of which the country could be proud. At no previous time had trade associations had a more important part to play. It had never been the way of the electrical industry to base its policy on scarcity but rather to build up its economics on plenty. To-day conditions made that difficult. The Association had always had advanced ideas in trading and in this respect the Electrical Fair Trading Council had much for which to thank it.

Mr. V. C. H. Creer, Mr. T. M. Adie and Mr. K. Scott Adie at the E.L.F.A. luncheon

In the course of his response Mr. Scott Adie said it was the aim of the members to make the best use of light. They did not aim at cutting down materials in order to reduce prices; they had established minimum requirements and drawn up schedules and each member endeavoured to produce the best within the schedules. The raw material position was difficult at present but members were doing their utmost to find suitable substitutes. They would not fall into the error of producing anything just for the sake of selling something.

Mr. A. E. Iliffe (past-president) proposed the health of the guests in an amusing speech. He said that the Association had

many good friends in the industry to whom it owed its success. He referred to the presence of Mr. P. Richbell (president, A.P.L.E.), Mr. L. C. Penwill (E.C.A.), Mr. V. Watlington (Fair Trading Council) and Mr. A. B. Wildsmith (E.W.F.). He also made a kindly (not to say flattering) reference to the electrical Press.

Mr. V. C. H. Creer (B.T.H. Co.) made the first reply to the toast and praised the Association for very fine work in the face of serious odds. There had been uninformed criticism of their need to raise prices and it gave them a feeling of frustration and anger that their efforts were not appreciated.

Mr. A. B. Wildsmith, who also responded, referred to the work which led up to a fair trading code for industrial lighting fittings. Although there had been some doubts, it was now admitted that it had been a great success.

Mr. C. A. Hughes, in proposing the toast of "The Past-Presidents," said that as chairman of the Electric Lamp Manufacturers' Association he wished success to E.L.F.A. (of whose Council he was a member). The two Associations were complementary. He regretted the absence of Mr. J. N. Stephens but welcomed Messrs. F. Winstanley, C. Harvey, A. E. Iliffe, A. J. Burbidge, F. W. Norris and K. Scott Adie, who he believed was continuing in office as president.

Mr. A. J. Burbidge, who replied, said that this was the last occasion on which he would be addressing members as an official of the Association. He reminded them that in negotiations a member should not represent merely his own firm but the whole of his industry.

Annual Report

In his report for 1950 the president stated that the membership was now 43 (including five associate members) in the following sections:—Decorative Fittings 24; Commercial Fittings 31; Industrial Fittings 34; Street Lighting Fittings 18. During the year the diverse interests of the Decorative and Commercial Fittings Section were separated. The principal move of the Industrial Fittings Section was the establishment of an E.L.F.A./E.D.L.A.C./E.W.F. agreement governing the distribution and sale of industrial type fittings and auxiliary gear which had secured a large measure of approval. The Street Lighting Fittings Section had continued to endeavour, in common with other sections, to keep prices down. Attention was being given to the possible simplification of the conditions of contract operated by the various public lighting authorities. An immense amount of work had been carried out by the Technical Committee under its chairman, Mr. J. A. H. Studholme; this work was of international significance. Reference was made in the report to the unfair incidence of purchase tax on interior lighting fittings. Representations seeking alleviation had been unsuccessful but acknowledgment was made of the generally helpful attitude of H.M. Customs and Excise.

Relationships with Government Departments and with kindred associations remained cordial; E.L.F.A. continued to be a strong supporter of the Electrical Fair Trading Council. Expert advice had been given to the Festival of Britain authorities.

The general level of sales during 1950 was most encouraging and it was apparent that business in 1951 would be limited only by the supply position of raw materials. Until the manufacturer was told not only what he must not do but what he might reasonably hope to achieve, long-term plans or prophesies were impossible.

Ipswich Electrical Association

THE annual dinner of the Ipswich and District Electrical Association was held at the Great White Horse Hotel, Ipswich, on 16th March under the chairmanship of Mr. E. J. Roberts. Among those present were Mr. C. T. Melling, chairman of the Eastern Electricity Board, who is president of the Association, the Mayor of Ipswich, and Mr. G. A. Vowles, controller, Yorkshire Division, B.E.A., a past-president.

The Association originated in 1933 from a meeting of electrical men in the town called by Mr. H. E. Blackiston. It then had 28 members; to-day's total is about 100. One activity pursued up to the outbreak of war was joint full-page advertisements in the local newspapers. The annual dinner was instituted in 1934 and has been repeated each year ever since. In 1935 a lecture programme was initiated and now there is a series each year, from September to April, on a variety of subjects to which architects, builders and other interested people are invited.

I.E.E. Section Dinner

A DINNER-DANCE held at the Café Royal on 20th March jointly by the Supply and Utilization Sections of the Institution of Electrical Engineers proved to be one of the most enjoyable social functions of its kind this session. Mr. S. E. Goodall and Mr. A. N. Irens, chairmen of the two Sections, jointly presided over the informal gathering of 333 members and their ladies, sharing the duties of pronouncing grace and welcoming the principal guests, Sir John and Lady Hacking, Mr. E. A. Evans (chairman of the Automobile Division, Institution of Mechanical Engineers) and Mrs. Evans, and Mr. and Mrs. W. K. Brasher.

OVERSEAS ELECTRICAL TRADE

Exports Fall in February

WITH three fewer working days it is not surprising that the exports of electrical apparatus and machinery during February showed a decline compared with those of January. The decrease of £2,154,065 is, however, somewhat more severe than might have been expected and the total of £10,179,673 is £852,395 below the figure for February last year. This reduction in business applies to both apparatus and machinery alike, exports of the former falling from £6,435,298 in February, 1950, to £5,948,473 last month, and those of the latter from £4,002,535 to £3,128,329.

Perhaps the most striking aspect of the figures is the fact that shipments of generating plant, which in February last year stood at £1,757,648, amounted to only £710,039. This is attributable to

TABLE I.—ELECTRICAL EXPORTS

Class	February, 1951	February, 1950
	£	£
Telegraph and telephone cables and wires (submarine)	93,699	108,163
Ditto, not submarine	453,547	832,422
Wires and cables, paper insulated	316,886	745,965
Ditto, rubber insulated	320,842	238,090
Ditto, cotton, silk or artificial silk insulated	34,484	55,295
Ditto, enamel, glass or asbestos insulated	70,900	59,076
Ditto, other	184,473	123,235
Commercial radio apparatus	272,670	268,355
Domestic radio apparatus	264,230	150,055
Telegraph, telephone and signalling apparatus	1,170,800	1,482,726
Radio loudspeakers	36,241	30,751
Telecommunication components, n.e.s.	341,431	344,559
Other telecommunication apparatus	91,377	51,464
Valves and cathode ray tubes	200,333	180,787
Carbons	25,417	13,450
Lamps, exceeding 24 V	64,466	60,258
Ditto, not exceeding 24 V	33,115	34,714
Flashlight bulbs for photographic and other purposes	747	89
Other lighting appliances	274,308	251,322
Primary batteries	120,559	63,259
Parts other than carbons	36,008	17,984
Accumulators for motor vehicles	144,195	131,601
Ditto traction	8,593	7,464
Ditto radio	5,329	1,411
Other portable accumulators	26,174	38,325
All other accumulators	10,170	19,316
Parts and accessories	69,481	30,181
Cooking appliances	97,656	104,947
Heating appliances	68,554	49,331
Parts and accessories for cooking and heating appliances	61,205	35,683
Flat irons	49,012	34,963
Commercial electrical instruments	124,994	97,720
House service meters	81,826	99,714
Time recorders and time switches	25,992	12,870
Other electrical instruments	95,088	71,563
Electro-medical apparatus (not X-ray)	40,819	29,563
X-ray apparatus, tubes and parts	118,108	75,388
Permanent magnets	24,799	10,927
Insulating cloth and tape	72,912	62,248
Other insulating materials	83,706	85,600
Unclassified electrical goods and apparatus	333,327	323,464
TOTAL electrical goods and apparatus	5,948,473	6,435,298
Diesel driven generators not exceeding 200 kW*	241,569	1,173,444
Ditto, exceeding 200 kW*	108,665	99,005
Other generating sets*	104,667	311,353
Generators exported without prime movers, and parts of generators†	255,138	173,846
Motors, railway, tramway and trolley bus	5,586	22,157
Ditto, other, not over ¼ h.p.	124,166	62,858
Ditto, over ¼ h.p. but under 1 h.p.	57,235	32,895
Ditto, from 1 h.p. to 250 h.p.	333,164	446,251
Ditto, exceeding 250 h.p.	53,122	50,053
Ditto, parts	67,231	53,213
Converting machinery	5,347	5,664
Transformers, including coils	530,888	547,473
Rectifiers for power house use	63,752	23,244
Motor starting and controlling gear	159,199	190,322
Switchgear and switchboards (not telegraph and telephone)	1,018,600	810,757
TOTAL electrical machinery	3,128,329	4,002,535
Washing machines (not exceeding 250 lb weight)	417,028	234,518
Ditto, parts	18,776	16,466
Vacuum cleaners	175,910	167,716
Ditto, parts	35,914	11,483
Other electrically operated portable appliances and parts	143,472	70,079
Portable electric tools	71,261	70,700
Unspecified electrical machines, machinery and parts	240,510	23,273
GRAND TOTAL	10,179,673	11,032,068

* The 1950 figures include generators without prime movers

† The 1950 figures are for parts of generators only

the virtual cessation of this class of business with Russia, which received only £30,153 worth of equipment compared with £1,053,002. Motor exports continued at much the same rate, an increased demand for f.h.p. machines being balanced by a decline in exports of motors in the 1–250 h.p. range.

TABLE II.—Distribution of Electrical Goods and Apparatus

Destination	Feb., 1951	Feb., 1950
	£	£
Channel Islands	53,040	34,028
Gibraltar	32,243	56,461
Malta and Gozo	5,202	13,671
Cyprus	23,168	24,936
British West Africa	92,892	85,817
Union of South Africa	350,265	435,412
Northern Rhodesia	15,426	72,925
Southern Rhodesia	56,340	130,931
British East Africa	306,152	168,091
Bahrein, Kuwait, Qatar and Trucial Oman	14,894	38,604
India	441,612	579,482
Pakistan	178,166	30,801
Malaya	261,833	217,957
Ceylon	62,101	67,394
Hong Kong	134,415	112,178
Australia	705,224	1,293,141
New Zealand	308,835	443,978
Canada	108,590	110,551
British West Indies	75,863	100,409
Anglo-Egyptian Sudan	22,022	16,728
Other Commonwealth Countries	38,201	68,891
Irish Republic	240,047	275,767
Soviet Union	15,220	22,803
Finland	142,266	32,075
Sweden	157,868	127,260
Norway	101,736	125,070
Iceland	6,295	6,367
Denmark	112,785	64,507
Poland	32,384	15,376
Germany	51,623	19,431
Netherlands	195,653	151,484
Belgium	74,382	83,292
France	85,914	82,452
Switzerland	47,267	39,684
Portugal	57,168	40,262
Spain	5,905	16,170
Italy	45,627	55,726
Austria	53,481	26,308
Hungary	4,313	16,124
Czechoslovakia	19,341	14,480
Greece	21,078	51,583
Turkey	84,760	12,891
Indonesia	11,187	27,689
Portuguese East Africa	1,435	13,015
Syria	20,607	25,657
Lebanon	8,976	16,893
Israel	8,242	48,828
Egypt	160,914	119,880
Arabia	4,409	4,724
Iraq	54,209	43,175
Iran	139,630	124,300
Burma	19,117	21,939
Thailand	31,280	27,565
China	20,892	2,565
United States of America	126,516	17,611
Colombia	4,833	5,410
Venezuela	69,056	141,882
Peru	55,314	8,916
Chile	5,941	3,268
Brazil	72,661	68,242
Uruguay	21,425	26,454
Argentine Republic	140,004	212,854
Other Foreign Countries	127,198	92,933
Total	5,948,473	6,435,298

Among other electrical machinery, switchgear and switchboards were a bright feature, shipments increasing from £810,757 to £1,018,600. Of the total exports of "other electrical machinery" (£1,777,786) South Africa accounted for £376,137 worth and India £327,206 worth.

As will be seen from Table II, Australia, India and South Africa continued to be the largest buyers of electrical goods and apparatus. Reduced purchases by these three countries were, however, responsible for the much lower figures for telegraph and telephone and p.i. wires and cables.

The radio market continued good with the domestic side in particular showing an advance from £150,055 to £264,230, of which Egypt accounted for £36,850 and Malaya for £23,026. Reductions in shipments to South Africa (from £165,208 to £52,009), Australia (from £559,209 to £224,131) and New Zealand (from £151,893 to £69,051) were mainly responsible for a decline from £1,482,726 to £1,170,800 in exports of telegraph and telephone equipment. Purchases by British East Africa rose from £26,632 to £167,909.

Nearly twice as many dry batteries were sold but the demand for accumulators showed little change. An increase in the value of heating appliances exported from £49,331 to £68,554 was offset to some extent by a fall from £104,947 to £97,656 in the value of cooking appliances disposed of. Similarly, an improvement in the electrical instrument market due to an increased demand for commercial instruments (from £97,720 to £124,994) and time recorders and time switches (from £12,870 to £25,992) was reduced by a decline in the sales of house service meters (from £99,714 to £81,826).

The good reception which British washing machines are receiving abroad is reflected in the increase in value of export sales from £234,518 to £417,028. The item "unspecified electrical machines, machinery and parts" at £240,510 was £217,237 above the February, 1950, figure.

Works Managers' Conference

"Works Managers and the Present Economic Situation" is the theme of the third national conference of the Institution of Works Managers (67–8, Chandos Place, London, W.C.2) which will be held at the Prince of Wales Hotel, Southport, from Friday, 13th April to Sunday, 15th April.

Railway Electrification

Recommendations of the Cock Committee

ABOUT two years ago a Committee of seven representatives of the Railway Executive and of the London Transport Executive with one consulting engineer was appointed at the invitation of the British Transport Commission to review methods of operating the electric railways under their control and to consider systems to be adopted in future.

Mr. C. M. Cock (then chief electrical engineer, Railway Executive) was chairman of the Committee. Its report has been accepted in principle by the two Executives, which have commended it to the Commission. Copies of this report, price 7s 6d, are obtainable from the Commission.

The main conclusions of the 1927 report of the Railway Electrification Committee (Pringle Committee) are confirmed by the present report (Cock Committee) which additionally is a valuable study of technical developments in this and several other countries during the intervening years. It is recommended that d.c. at 1,500 V collected from an overhead conductor line should be the standard system for all future railway electrification in this country. The Committee does not, however, wish to rule out the possibility of using d.c. at 3,000 V, or single-phase a.c. at 50 c/s or lower frequency, for secondary lines with light traffic.

There are two exceptions. The first concerns an area to be earmarked for the third-rail system of the former Southern Railway. The Commission endorses the reservations made in the Cock report regarding any such area, the exact boundaries of which on the western side must be further considered. The only other exception would be areas within which the fourth-rail system may be used, namely, additions to lines operated by the London Transport Executive and also possibly new self-contained and purely urban systems in the provinces or cities other than London.

With one or two minor reservations, the other recommendations of the Pringle report remain substantially valid under present-day circumstances. Regarding connecting services in the event of two systems being approved, the Committee is satisfied that designs for 750 and 1,500 V dual-voltage locomotives and multiple-unit trains can be developed at an extra cost that would not be excessive in relation to the flexibility of operation thereby obtainable.

The report calls attention to ways in which the flywheel locomotive could facilitate the haulage of freight trains and multiple-unit stock, without sudden cessation of draw-bar pull at unavoidable gaps in the conductor rail on third-rail d.c. lower voltage systems. It is also recommended that in the preparation of any scheme of conversion the complementary use of diesel power should be the subject of economic assessment as an alternative to the complete electrification of shunting yards and/or the retention of some steam locomotives for shunting purposes.

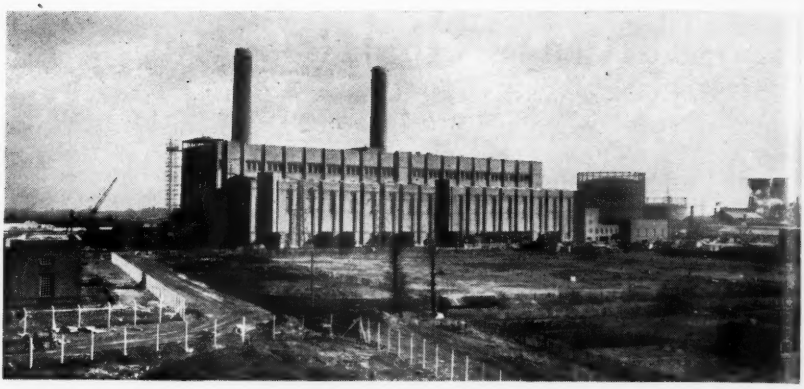
The report includes a chapter on the general justification for railway electrification and much tabulated statistical information about the railway system in Britain with maps indicating traffic densities, lines already electrified and the recommended boundary for third-rail operation.

Vacuum Science Publication

A NEW quarterly journal has been published under the title of *Vacuum*. It does not aim at describing vacuum plant, as such; it addresses itself to the scientist whose research is aided by vacuum methods, to the industrialist whose productive capacity depends upon vacuum processing and to the specialist whose work is based on the results obtained by the first two.

The new journal is believed to be the only one of its kind in the English language devoted to this subject. It is made up in two main sections. The first issue (January, 1951) contains original contributions by eminent authorities and classified abstracts on perforated pages printed on one side only for convenience of filing, with cumulative author and subject indexes.

The journal is available by subscription (25s in the British Isles and 30s abroad) from W. Edwards & Co. (London), Ltd., Worsley Bridge Road, Lower Sydenham, London, S.E.26.



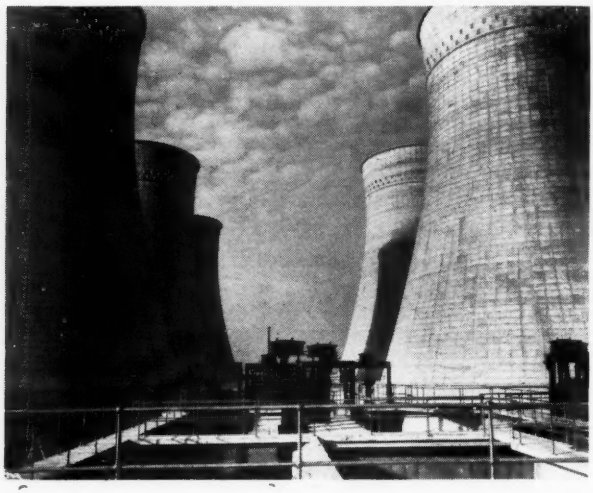
Croydon "B"

Preliminary Details of Construction

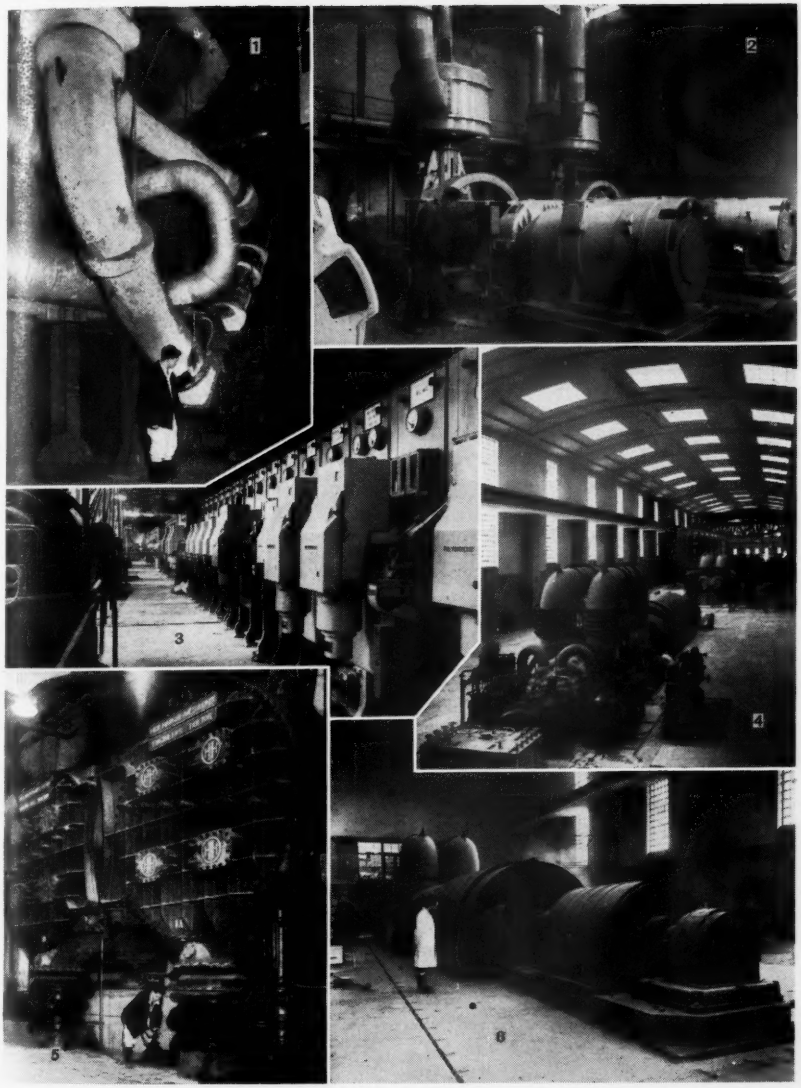
As the construction of Croydon "B" generating station has now reached an advanced stage the time seems suitable to publish brief details of the plant being installed. Initially, this station will have four Metropolitan-Vickers turbo-alternators, each of 52,500 kW capacity (50,000 kW main alternator and 2,500 kW auxiliary machine on the same shaft). The steam conditions at the turbine stop valve will be 600 lb/sq in at 850 deg F.

The main alternators will generate at 11 kV and in the case of one machine this voltage will be stepped up by means of a unit transformer to 33 kV and connected to the station 33 kV switchgear feeding the Croydon district. In the case of the three remaining machines the unit transformers will step up the voltage to 132 kV which will be switched by means of air-blast circuit breakers on to the busbars at the B.E.A. substation about half a mile from the generating station.

Each of the auxiliary alternators will



Six cooling towers will be built in the first instance but there will ultimately be nine



(1) In the boiler house basement this exhaust fan handles the mixture of pulverized coal and heated air for one furnace. (2) These two vacuum pumps are used in conjunction with the dust-handling plant. (3) The 3.3 kV auxiliary switchgear is situated in the feed pump annexe. (4) Initially there will be four 52,500 kW turbo-alternators. (5) Each set is equipped with a twin surface condenser in the turbine house basement. (6) The generating sets have 50,000 kW main alternators and 2,500 kW auxiliary machines on the same shaft

The main control room is situated on a gallery overlooking the main turbine floor

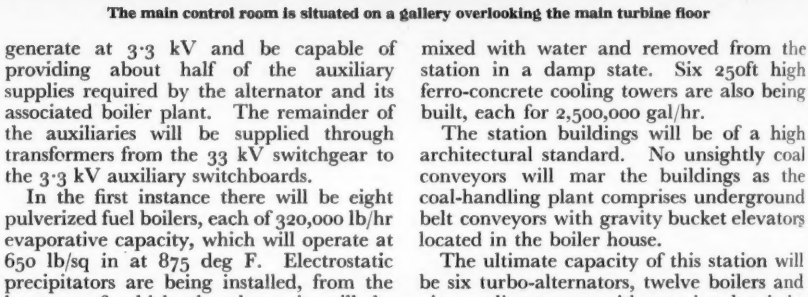
generate at 3·3 kV and be capable of providing about half of the auxiliary supplies required by the alternator and its associated boiler plant. The remainder of the auxiliaries will be supplied through transformers from the 33 kV switchgear to the 3·3 kV auxiliary switchboards.

In the first instance there will be eight pulverized fuel boilers, each of 320,000 lb/hr evaporative capacity, which will operate at 650 lb/sq in at 875 deg F. Electrostatic precipitators are being installed, from the hoppers of which the dry grit will be removed by means of a vacuum plant, mixed with water and removed from the station in a damp state. Six 250ft high ferro-concrete cooling towers are also being built, each for 2,500,000 gal/hr.

The station buildings will be of a high architectural standard. No unsightly coal conveyors will mar the buildings as the coal-handling plant comprises underground belt conveyors with gravity bucket elevators located in the boiler house.

The ultimate capacity of this station will be six turbo-alternators, twelve boilers and nine cooling towers with associated switchgear and auxiliary equipment.

Left: **The turbine control panels are situated on the turbine house floor adjacent to their associated machines.** *Right:* **No. 2 boiler control panel**



Wages and Labour Relations

Example of the Electricity Supply Industry

By W. WALSH, A.C.I.S., F.R.ECON.S.

THE *Ministry of Labour Gazette* can hardly be described as light reading matter, but nevertheless it has its points of interest, and none more than those relating to the level of wages. Latterly the index of weekly wage rates has begun to reflect the success (or failure, according to one's point of view), of the protracted negotiations on wages which have taken place over the last twelve months. From a stationary figure of 110 (indicating that the level of wages had risen by 10 per cent between June, 1947, and January, 1950) which had persisted from the beginning of the year to September, 1950, the index jumped to 113 in November with a fair degree of certainty that it will rise again as a result of the increases recently awarded to engineering workers, civil servants, London busmen and the electricity supply industry's manual workers.

The doctrine of "wage restraint" was formally abandoned last September and the index of weekly wages merely illustrates how successful some unions were in anticipating this abandonment. Thus the recent rumblings felt inside the supply industry have now culminated in a compensatory rise and this makes an examination of the labour negotiating machinery of particular topical interest.

National and Local Arrangements

The pyramid arrangement of National Councils, Board (and Committee in the case of the building and civil engineering workers) with their attendant District Councils and Board (and Works and Staff Committees), is one fairly well known within the industry and any confusion which exists regarding the functions of each level of organization is certainly not to be laid at the doors of the labour relations section of the British Electricity Authority which has taken what, in retrospect, appears to have been elaborate pains to ensure that the fullest information has been available to all employees. Nevertheless since one's immediate interest is always one's own position, the following diagrammatic representation of the organization of these various bodies may be worthy of repetition:—

Joint Negotiating Machinery

1. *Covering Manual Workers*	2. *Covering Clerical and Administrative Workers*
National Joint Industrial Council	National Joint Council
District Joint Industrial Councils (14) (one to each Area Board/Division Area)	District Joint Councils (14) (one for each Area Board/Division Area)
Works Committees (as desirable)	Staff Committees (as desirable)
3. *Covering Engineering Staffs*	4. *Covering Building and Civil Engineering Manual Workers*
National Joint Board	National Joint (Building & Civil Engineering) Committee
District Joint Councils (14) (one to each Area Board/Division Area)	Local Representative Discussion

It will be observed that two classes of employees are not covered by national machinery, i.e., higher executive staffs for which machinery has still to be evolved and sundry staffs, that is, waitresses, cleaners, porters, etc., some of whom are covered by the old Whitley Council arrangements and some by purely local agreements.

The National Joint Council and National Joint Industrial Council (which together provide for about 85 per cent of the employees of the B.E.A. and Area Boards) are so organized that there are effective channels for mutual discussion between employer and employee from the highest to the lowest levels. The National Joint Board, however, with fewer persons to cover does not require its machinery to extend below the level of the District Boards and in the case of the Building and Civil Engineering

Committee it can be assumed that the number of employees is too few to warrant the development of ponderous negotiating machinery at lower levels.

At national (and at district) level negotiations are conducted in all cases between representatives of the trade unions representing the employees and appointees of the B.E.A. and Area Boards representing the employers. The important matter is, however, the functions at the various levels of negotiation and in this respect it should be noted that in every case it is the function of the national body " to settle by negotiation the terms and conditions of employment of . . . workers engaged in the electricity supply industry." Thus as in the recent negotiations leading to the 1½d per hour award, wherever the initiative arose for the discussions which led to the award the proper forum for discussion was, and remains, the National Council chamber.

Functions of National Bodies

Naturally mere discussion and determination of wages and service conditions is not the only function of the national bodies. Indeed the scope of their functions is very wide embracing the determination of disputes which the districts have been unable to settle; securing of joint action between employers and employees; consideration of measures to secure the inclusion of workers within their appropriate unions; the collection of statistics, etc., relating to employment; inquiring into special problems relating to employment in the industry both at home and abroad; making representations to the Government and considering matters referred to them by such bodies.

It is assumed that for the greater majority of practical purposes the national bodies will always reach agreement (and agreement involves the acceptance of a resolution by a majority of both Electricity Boards' members and trade unions' members, voting being taken separately). Should, however, a body fail to agree, then at the request of a majority of either side the difference can be referred to the Industrial Court or any other agreed tribunal. If such a submission for arbitration is made under the constitution of the national bodies any award becomes binding upon the Boards and the trade unions.

The most frequently exercised function of the national bodies is " to consider, approve or refer back the minutes of or the report made by the district bodies concerning the terms and conditions of employment of employees (covered by the actual body) engaged in the industry and to determine any matter upon which the district body has failed to agree and which has been referred to the national body." In the case of the National Joint (Building and Civil Engineering) Committee, where no district body exists, the duty of determining disputes which have arisen between the local representatives of the National Federation of Building Trade Operatives and the B.E.A. or Area Boards still resides with the national body.

This function is of first-class importance since the district bodies are much closer to the realities of employer/employee relations than are the national bodies. It is also true, however, that sometimes a decision at district level may run contrary to the interests of the industry and employees if applied nationally and for this reason scrutiny and approval at the highest level before a decision is implemented is a safeguard that few would care to dispense with. The channels of communication are two-way: the national bodies negotiate the terms and conditions of service but they also receive the reports and recommendations of the district bodies and may call upon these to assist them by the collection of facts relative to the operation of existing agreements, the temper of employees and employers, and the general conditions obtaining within the industry.

District Responsibilities

Thus the premier responsibilities of the district bodies are to:—

(1) Secure joint action between employers and employees, to ensure the observance of agreements reached by the national bodies; (2) make recommendations to the national bodies upon terms and conditions of service and to consider matters in this respect referred to them by the national body; and (3) to inquire into differences that may arise concerning these terms and conditions of service, to make recommendations on them and to attempt to settle them or failing this to remit them to the national body. Towards these ends too the district bodies are empowered to collect information and statistics relative to employment in the supply industry or any other.

The first and the last of these responsibilities are complementary and obviously very important. It is beyond reason to expect that any man-made agreement should be free from all ambiguity. Agreeing on what the terms and conditions are, and securing observance, is a big task and the responsibility of the districts to advise the national body on the operation and application of agreements is one which means much research and study. The power to amend nationally negotiated agreements, as explained, lies with the national bodies but naturally as conditions within the industry alter the district bodies are more sensitive to the need for changes in the agreements to meet the new conditions.

Works and Staff Committees

In the case of manual employees and of administrative and clerical workers (who together represent the bulk of the employees of the B.E.A. and Area Boards) the maintenance of an intimate touch in employee-employer relationship is further aided by the works committees (in the case of manual workers) and staff committees (in the case of clerical, etc., workers). This is the lowest level of negotiation and the only one at which the actual worker-appointed representative (as distinct from trade union nominee) comes into direct negotiation with his employer's representative. Partly for this reason there is no hard and fast number of staff or works committees in existence.

Unlike the District Councils which are fixed at one to each Area Board/Division Area the staff and works committees are established to suit local circumstances. In some instances a committee may draw its members from a wide area, particularly in the case of rural districts, in others there may be one quite large committee for one centre (say an Area Board headquarters or a large power station). The guiding principle for the establishment of the local committee is local need and not any geographical or physical feature. Committees may embrace merely Area Board staffs or both distribution and generation personnel, the only requirement being that whatever its composition, the committee must ensure fair representation of both the Electricity Boards and workers employed within its area.

The constitution of the works or staff committees is not hard and fast so far as representation is concerned, the number of employees' representatives and of employer representatives being determined from time to time by the district bodies under whose auspices they function. Employee representatives must be members of a trade union which is a party to the national agreement, but non-trade-unionists may nevertheless participate in the local elections for their appointment.

The functions of the local committees are restricted in such a manner as to prevent their overlapping the functions of the district bodies. The committees are enjoined, however, to assist in the observance of national agreements; to secure the employees' interest in and responsibility for the conditions under which they work; to deal with matters of day-to-day arrangements for such things as working hours, breaks, time recording, holidays, shift rotas, etc., and payment of salaries and wages. These functions, particularly the last, form the major part of their activities but additionally the committees arrange for the exhibition of rules and supervise notice boards (an important function in these days of many notices) and consider such rules and regulations as fall within their jurisdiction.

Settlement of Minor Grievances

A very important part of their functions is to settle, where possible, minor internal grievances (such for example as may arise out of some purely local regulation) and to inquire into any differences (referred to the committee by either employee or employer) concerning the application of the national agreements. It is in respect of this that most difficulties arise, for from time to time differences of opinion on what the agreement really means arise. In such cases the staff or works committee has power to investigate fully all the facts surrounding the difference and to make recommendations.

It is incumbent upon this committee to use all available means to settle the difference and if this proves impossible it can remit the whole case to the next highest negotiating body, i.e., the district organization. The reference may be made either by the employee or employer representatives but even if a difference is resolved the district body has a watching brief over the proceedings of the local committees and it may veto any recommendation they make,

if it considers it to be contrary to the national terms and conditions of employment.

Thus while the importance of local negotiation and discussion is anything but illusory, the danger of the application of purely parochial decisions achieved by a staff or works committee is avoided by requiring that its minutes shall be approved by the district body. The latter is in turn protected from the danger of narrow regionalism by the fact that its decisions require the approval of the national body before becoming operative. It may appear to be a long road that an employee's grievance has to travel before being settled, but during that journey it is considered and debated by his own and his employers' representatives equally in duty bound to arrive at a conclusion fair and reasonable to the industry as a whole.

An American gentleman caught in the toils of our British "committee" system during the last war criticized it in his "Top Secret." Mr. Ingersoll may have felt from his own national point of view that committees "waste hours in producing minutes," nevertheless difficult though it may be to produce concrete evidence of the desirability of the system within the electricity supply industry it has so far provided a stability of conditions and a measure of contentment envied by other industries more dynamically organized.

In spite of this it may be that over two years' experience of the labour relations organization has led some of those most intimately concerned with it to have second thoughts. If this is so, an airing of their more constructive ideas (at a time when the "streamlining" of administration in the interests of higher productivity is of national importance) would now be of more than purely academic interest.

AUSTRALIAN NOTES

From Our Own Correspondent

SYDNEY'S power supply has been affected by the "one-day-a-week" coal strike which at one time put some 150,000 workers out of employment in that city, while a strike of boilermakers at Bunnerong and Pyrmont power houses has also caused concern.

The construction of the largest hydro-electric power station in Victoria is included in the plans for the new Eildon Reservoir. Estimated annual output of electricity (according to the amount of water available, is 225 million kWh and this will be fed into the State Electricity Commission's supply network. Erection of the power station buildings is being undertaken by the Utah Construction Co., which has already sent four civil engineers to Australia to take charge of operations. Tenders which have been received for the generating plant are now being examined.

Among the main points from the annual report of the State Electricity Commission of Victoria are: Electricity sales reached a record of 1,880 million kWh, an increase of 9 per cent on the previous year. Despite construction setbacks new consumers numbering 18,870 were also a record. Installed generating capacity was increased to 508,465 kW, and for the first time the system successfully carried peak loads exceeding half a million kW. Capital expenditure on new works during the year totalled £14 million. Loan requirements for capital works during the current year are estimated at £26 million. Operational expenditure rose by over 20 per cent to £10,688,025, largely because of increased costs of labour and materials and the need to use expensive substitute fuels. Income from all sources was £10,338,657, of which nearly £9¼ million was derived from electricity supply. Loss on the year's operations was £349,368, reduced by a transfer of £100,000 from the rate stabilization reserve, now exhausted.

Electrical companies here have been making substantial issues of new shares, but immediate capital issue control has been reintroduced, and stringent priorities will be followed. However, favourable consideration is to be given to companies manufacturing insulators and other electrical ceramics, while applications from industries in which production is below the level needed for national security will receive consideration if they fall into a certain group which includes the manufacture of large-scale power-producing equipment, both thermal and hydro-electric; large equipment for power transmission and distribution; and electrical equipment for internal combustion engines.

Leicester Industries Exhibition

The Leicester, Leicestershire & East Midlands Industries Exhibition and Trade Fair is to be held from 23rd May to 2nd June at the Granby Halls, Leicester. It will be opened by H.R.H. the Duchess of Kent.

Commerce and Industry

Sulphur Supplies

Specialists for the Army

LAST week at Birmingham Mr. B. Kay, regional controller, Board of Trade, said that a scheme for the allocation of the available sulphur was being worked out. There were prospects of bigger supplies from the United States but if these failed the scheme would have to be put into force. It was announced on Monday that the U.S. was supplying an additional 19,000 tons to meet the immediate shortage.

Ulster Electricity Workers' Increase

As from 12th March the "Schedule A" rates paid to manual workers covered by the Northern Ireland J.I.C. for the Electricity Supply Industry and employed by the Electricity Board for Northern Ireland and the Belfast and Londonderry Electricity Departments were increased by 1½d an hour.

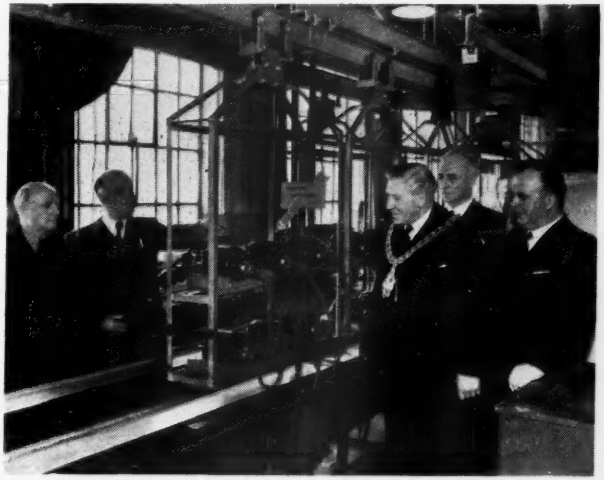
Three-Millionth F.H.P. Motor

On 13th March the three-millionth f.h.p. motor came off the production line at the Coventry works of the British Thomson-Houston Co., Ltd.

The Mayor of Coventry, Ald. Joseph Howat, visited the works during the final assembly, testing and packing of this motor, which was one of a batch of 5,000 ¾ h.p., 110 V, 60 c/s, single-phase induction motors, for an order received from the Canadian General Electric Co.

Mr. E. H. Ball, managing director of the B.T.H. Co.; Mr. H. Jack, director and chief electrical engineer; Mr. W. W. Vinsen, director of manufacture; Mr. H. J. Armstrong, manager of the Coventry works; and other senior officials of the company accompanied the Mayor, and at a subsequent luncheon were joined by 36 members of the f.h.p. design and engineering, manufacturing, and commercial staffs.

In connection with this event the company produced an illustrated booklet and an account of 50 years' progress in development and manufacture.



The Mayor of Coventry, accompanied by Mr. E. H. Ball and Mr. W. W. Vinsen, inspects the three-millionth B.T.H. f.h.p. motor on endurance test. On the left, Mr. H. J. Armstrong is seen explaining the procedure, and on his right is Mr. J. Taylor, Coventry P.R.O.

Non-Ferrous Scrap

The Minister of Supply has made the Non-Ferrous Metals Prices (No. 2) Order, S.I. 1951 No. 425, which came into force on 17th March, to overcome certain anomalies in scrap metal trading and to remove difficulties which have prevented the free flow of non-ferrous scrap to industry during recent weeks.

Supplementary Reserve

Attention is being drawn by the War Office to the need for specialists and tradesmen in the reconstituted Supplementary Reserve. These men are required for a number of arms and services including the R.E.M.E., R.E., R.A., R.A.C., Royal Signals, R.A.S.C. and R.A.O.C.

The list of tradesmen includes electricians, fitters, machinists, boiler makers, radio engineers and mechanics, linesmen, switchboard operators, welders and engine hands. Officers with technical qualifications are also needed.

The age limits are 18 to 40 (or up to 50 in certain cases) and the term of service is four years. Reservists may or may not be required to undergo 15 days' annual training; pay is at the normal army rates and bounties are paid in certain categories. Volunteers undertake to serve in the army if a certain state of emergency arises. Men are accepted for the Reserve only if they have been "cleared" by the Ministry of Labour in respect of their "reservation" in industry.

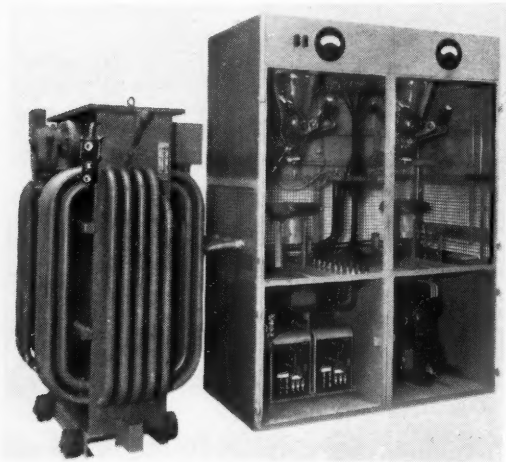
Full details of the arrangements are given in a booklet (W.O. Code 5746) prepared for the War Office by the Central Office of Information.

Electricians' Strike

The electricians employed in the contracting departments of the London and Eastern Electricity Boards who struck work because one of their number would not join the Electrical Trades Union were last week joined by about forty men employed in the West Kent District of the South Eastern Board.

Special Rectifier Equipment

A specially developed twin-bulb mercury-arc rectifier equipment has recently been made by the Nevelin Electric Co., Ltd., to the order of Lancashire Dynamo & Crypto South Africa (Pty.), Ltd. In the accompanying illustration the doors have been removed to show the ignition units and circuit breaker in dust-proof lower compartments. This unusual feature is demanded by the circumstances governing the situation of the unit. The equipment, which has an output of 150 kW at 500 V, is the first of five similar units for traction substations on the electrified railway of the Consolidated Diamond Mines, South West Africa.



Special twin-bulb rectifier unit for South West Africa

E.A.W. Conference

The annual conference of the Electrical Association for Women is being held this year in London, on 4th April. The annual general meeting at the Connaught Rooms will be followed by a luncheon at which the speakers will be Mr. Philip Noel-Baker, Minister of Fuel and Power; Dr. Edith Summerskill, Minister of National Insurance; Mr. William L. Batt, Minister in Charge, Economic Co-operation Administration to the United Kingdom; and Mrs. M. E. C. Stewart, chairman of the Perth branch of the E.A.W. The Dowager Lady Swaythling will preside. A meeting of the Council will take place in the afternoon and there will be tea at the E.A.W. headquarters. The golf competition for the Lady Hughman Challenge Bowl will be held on the previous day at the Highgate Golf Club.

Cambridge Contractors' Dinner

The loyalty of Cambridge members was commended by Mr. A. F. Plummer, M.C., vice-president of the Electrical Contractors' Association, when he spoke at the Cambridge Branch dinner at the Bull Hotel, Royston, Herts, on 13th March. He said that the Association was one of the most successful employers' organizations in the country. It had been accused of "selling out," but it was putting up a stout fight in every direction. It had agreed with a nationalized industry to a principle which had worked, but it was not resting on its laurels.

Mr. Plummer was responding to a toast proposed by Mr. W. Morley (Morley & Duke) who recalled that 1951 was the golden jubilee of the Association. He said that the activities of the B.E.A. had been responsible for many difficulties. The Authority was out for the contracting and retailing business but there was no need for that sort of trading and he suggested that the Council of the E.C.A. should not allow them to get in the position of poor relations.

The Branch's activities during the past year were reviewed by the retiring chairman, Mr. A. L. Cain, who urged members to support Mr. J. Denley, who was taking over that office. Mr. R. H. Clark, chairman of Royston U.D.C., Mr. B. C. Brown, Mr. F. Greathead, Mr. R. C. G. Dougherty (Johnson & Phillips) and Mr. Vowden (B.T.H. Co.) also spoke.

National Fuel Resources

At a meeting of the North Western Fuel Luncheon Club at the Engineers' Club, Manchester, next Wednesday there will be a debate on "The Most Efficient Use of the National Fuel Resources." The debate will be opened by Mr. Sydney N. Duguid (coal), Mr. G. F. Ward (gas) and Mr. A. J. Emery (electricity).

Oil-Filled Cables

A revised edition of the book "Oil-Filled Cable Installations" has just been issued by the Pirelli-General Cable Works, Ltd., Southampton, an associated company of the G.E.C. This excellently produced 211-page book is well illustrated and contains a wealth of relevant information on oil-filled cable. It starts by outlining the oil-filled cable installations made by Pirelli-General, both in this country and abroad, after which the system is explained and the manufacture of oil-filled cable described. The use of this cable for 33, 66, 132 and 220 kV transmission is then dealt with and its performance described; there follows a section on accessories and auxiliary apparatus and methods of installation. A number of useful tables are included.

Batteries for Assam

For the new electrification programme by the Assam Oil Co. at the Digboi Refinery, Upper Assam, a considerable quantity of British equipment is being supplied. Among the orders received has been one for a large steel-alkaline battery and associated equipment from Nife Batteries of Redditch, Worcs. Consisting of 95 Nife cells, type AS9, with a capacity of 95 Ah, the battery will supply power at 110 V for four services and a variety of emergency duties in the refinery's new power station. Under normal working conditions it will be used to close two circuit breakers (an operation requiring 20 kW), to trip twenty-four other circuit breakers (each requiring 800 W), to illuminate 15 W indicator lamps and to operate fractional h.p. governor motors for any one of twelve diesel alternators. In the event of a breakdown in the mains supply the battery will carry the station's emergency lighting load of 500 W, together with the indicating and f.h.p. motor loads, for a period of up to two hours. At the end of this time it will then be required to carry out up to 100 switch closing operations, each demanding about 182 A, and still deliver not less than 80 per cent of its normal voltage (110) during the final operation.

Technical Information and Documents

As from 1st April the Technical Information and Documents Unit (T.I.D.U.), which for a number of years has been attached to the Board of Trade, becomes part of the Information Services of the Department of Scientific and Industrial Research. For the present the Unit will remain in Lacon House, Theobalds Road, W.C.1, where it will continue to hold at the disposal of industry the large collection of unpublished documents, interest in which has recently revived on account of the valuable information they contain on the production and use of substitute materials.

D.S.I.R. Report

The report for the year 1949–50 of the Department of Scientific and Industrial Research (Cmd. 8169, H.M. Stationery Office, price 4s 6d) mentions nearly a thousand researches, completed or being studied, from most industries.

Control Gear Window Display

The accompanying picture shows a window display which has recently been arranged by Brook Motors, Ltd., at their new London

Display of control gear at the new London showrooms of Brook Motors

showrooms at 16–18, Palmer Street, Westminster, S.W.1. The equipment shown includes the company's Z type control gear.

Hoover Development in Wales

By early May the new extension to the Hoover (Washing Machines), Ltd., factory at Merthyr Tydfil will be in production and by the end of that month the whole work, including the office block, will be completed. Employment is expected to increase from 1,200 to 1,600 people. Hoover, Ltd., has added £200,000 worth of plant and tooling.

With the approval of the Wales & Monmouth Estates and the Board of Trade, the company proposes to make further extensions which would have the effect of trebling the size of the original factory and increasing the number employed from 1,200 to 2,300. In this extension £500,000 worth of further plant and tooling would be installed. Government approval for this move is awaited.

X-Ray Analysis Conference

The X-Ray Analysis Group of the Institute of Physics is to hold its Spring Conference at Ashorne Hill, Leamington Spa, on 12th and 13th April, when some eighteen papers on the texture and structure of metals will be read. Sleeping accommodation is available for 180 members and meals can be provided for those who wish to travel each day. The conference is open to all interested parties and further details are available from the Deputy Secretary of the Institute, 47, Belgrave Square, S.W.1.

E.D.A. Annual Luncheon

Sir James Turner, president of the National Farmers' Union, will propose the toast of "Electrical Development" at the annual luncheon of the Electrical Development Association at the Connaught Rooms, London, W.C.2, on 13th April. Lord Citrine, president of E.D.A., will respond. Mr. E. R. Wilkinson, London, chairman of the E.D.A. Council, will propose "The Guests" and Sir Norman Kipping, director-general, Federation of British Industries, will reply.

Plant for Snowy Mountains Scheme

The English Electric Co., Ltd., has received an order for water turbines and alternators valued at over £250,000 from the Snowy Mountains Hydro-Electric Authority, Australia. The plant will be made under English Electric supervision at the Scotstoun, Glasgow, works of Harland & Wolff, Ltd. Delivery of the first set is scheduled for early 1953. The two 30,000 kW sets ordered will be installed at Guthega, the "pilot" station at an altitude of over 4,000ft on the Snowy River itself a few miles from its source on Mt. Kosciusko. Guthega is the first of sixteen plants which will have a total output of 2¾ million kW. The turbines, each of 45,500 h.p., and alternators will be similar to those supplied by the English Electric Co. for the Loch Sloy hydro-electric plant in Scotland.

Electrical Supervisors' Salaries

The agreement on salaries between the National Federated Electrical Association and the Association of Supervising Electrical Engineers has been revised to provide that the cost-of-living addition shall be raised from 25 to 35 per cent of the basic salaries. This will result in the following gross rates:—London: staff foreman £562; staff foreman (supervising) £628; superintending engineer £695. Corresponding rates for other districts are £520, £570 and £621 respectively.

A.S.E.E. Annual Dinner

This year's annual dinner and reunion of the Association of Supervising Electrical Engineers is to be held on 13th April at the Connaught Rooms, London. Tickets, one guinea for members and 25s for guests (including guest members), are obtainable from the general secretary.

Scottish Electricians' Wages

The Electrical Contractors' Association of Scotland and the Electrical Trades Union have reached agreement on increases in wages of electricians in Scotland. Journeymen electricians will receive an increase of 3d an hour, bringing their hourly standard rate to 3s 3d, and increases for armature winders will raise their standard rate to 3s 4d. There will be proportionate increases for apprentices. The new rates will take effect from the first full pay-day after 2nd April.

Census of Distribution

The Board of Trade reminds traders that the Census of Distribution forms sent out at the beginning of the year are to be completed and returned by 31st March. The only exemptions are for those traders who have asked for an extension because their business year ends between 31st December, 1950, and 6th April, 1951.

Electrical Fair Trading

From the Electrical Fair Trading Council, Sardinia House, Kingsway, London, W.C.2, we have received a copy of "A History of the Electrical Fair Trading Policy" (8 pp.) compiled by the secretary (Mr. A. S. Lowe). Copies may be obtained from the Council (gratis) by those in the industry.

Trade Announcement

Newman Industries, Ltd., Yate, Bristol, have been appointed sole selling agents in the United Kingdom for Franco Tosi and Sisma diesel engines.

Raw Cotton Preparation

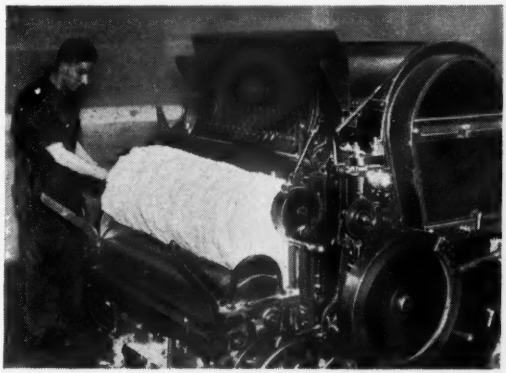
Pneumatic Handling of Materials

IN the *Electrical Review* of 23rd February we outlined the major textile developments of James Finlay & Co., Ltd., the outstanding feature being the completely new cotton works at Catrine. The works is designed for the complete manufacture of cloth from raw cotton, except for the finishing processes such as bleaching and dyeing. It is convenient to visualize the processes as a whole in the four principal groups of preparation, carding, spinning and weaving, although different groupings can be made, according to different viewpoints, and there are very many possible sub-divisions.

We are dealing with the raw cotton preparation exclusively in this article, partly because it represents the first group of operations in the works in the production sequence, partly because it is embraced by a self-contained production plant and largely because it exemplifies the introduction into British textile industry of the modern conception of materials handling—in this case pneumatic because of the fluffy character of the material.

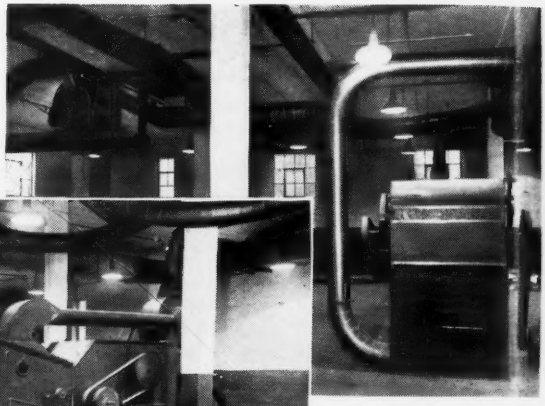
The plant as a whole is compact and arranged on two floors, with the first section immediately above the other section. On the first floor the cotton is revived after compression as nearly as possible to its original or natural condition, while on the ground floor the cotton is given its first process shaping in the form of fibre sheeting or lap. But at every stage throughout these two sections the work of cleaning and mixing goes on continuously. The compressed bales as they are received at the factory weigh about 500lb each, and at the outset several bales are grouped around the receiving end of an opening machine. Layers of cotton from the different bales are placed on a lattice feed conveyor which is an integral part of the machine, the cotton from the bales being initially well mixed in this simple process. At the same time the material is delivered to the first of two chambers in this combined machine. Immediately inside the chamber the cotton passes under a vertical swinging flap door, and if the cotton builds up against the flap, this will move forward to a point at which, by a simple lever action, the transmission belt for the lattice conveyor is changed over from a fast to a loose pulley, thus stopping the conveyor. When the flap swings back the reverse happens, so that the rate of the feed flow of the raw material is well regulated.

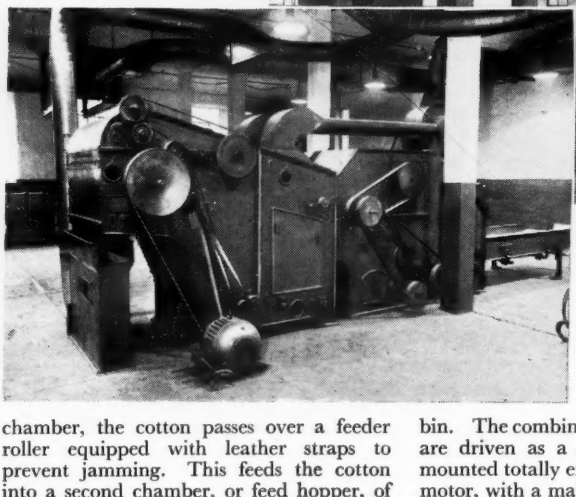
At the forward end of the chamber the lattice conveyor serves a spiked steeply inclined conveyor which carries the cotton to the top of the chamber where it is met by another spiked conveyor or evener roller travelling backwards. By reason of the different directions of the two assemblies of spikes the cotton is well torn apart and only a small portion is passed forward at any one time, and this in the form of small tufts of cotton. Finally, in respect of the opening



The product of the preparation plant is lap of predetermined weight and length

From the delivery bin of the feed hopper the cotton is airborne to any of six ceiling suspended valves; one valve top left. Below: The combined opener and feed hopper is the subject of a 6 h.p. group drive

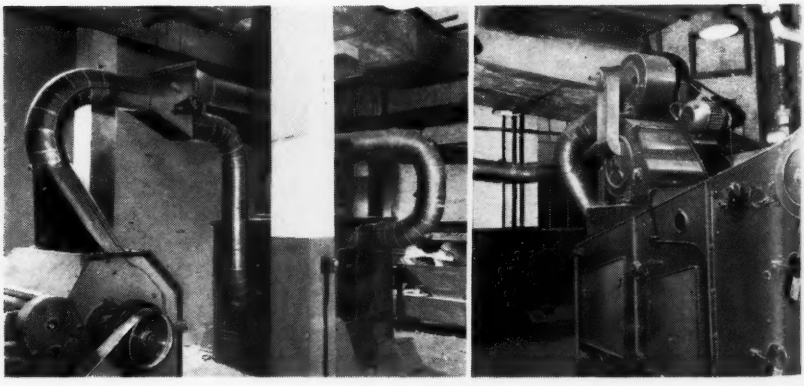


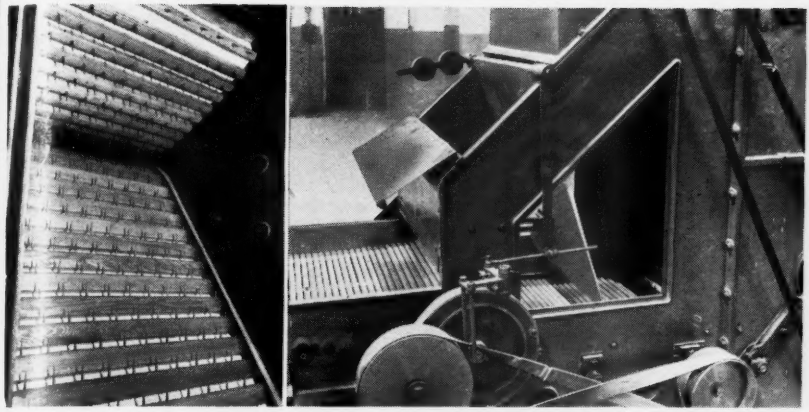


chamber, the cotton passes over a feeder roller equipped with leather straps to prevent jamming. This feeds the cotton into a second chamber, or feed hopper, of the machine in which the operations and components are practically identical with those in the opener, except that the spikes on the inclined conveyor and evener roller are much finer to meet a further stage in this continuous process of mixing and cleaning.

From the evener roller of the feed hopper the cleaned and mixed material falls into a delivery bin. The combined opener and feed hopper are driven as a group by a 6 h.p. floor-mounted totally enclosed external fan cooled motor, with a main belt transmission on to a clearance roll at the delivery end, and on either side there are various subsidiary transmissions to various components including the spiked conveyors and rollers, the

The material for the porcupine opener (left) and the vertical opener (centre) is carried by an air stream to a feed hopper surmounting which is the motor driven fan creating the stream



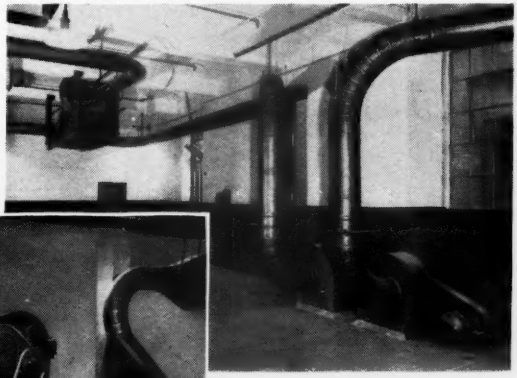


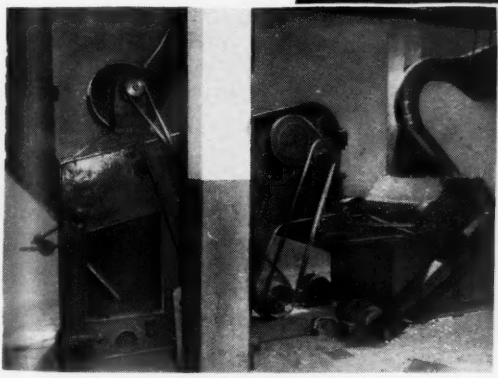
Inside each feed hopper is a spiked inclined conveyor operating against a spiked roller and (right) the cotton passes under a swinging flap which controls the feeder conveyor through fast and loose pulleys

lattice conveyor and the dust extraction fan serving both chambers. The motor is started up from a central control board, but there are several emergency stops about the machine which require resetting before the motor can be started again.

From the delivery bin of the feed hopper the cotton is airborne to any of six ceiling suspended valves, each situated centrally over a mixing stack where the cotton is allowed to rest to regain its natural form. The air stream for this system is created by two 3 h.p. motor driven fans, each serving a line of three valves. Each motor runs at 1,455 r.p.m. and there is a 3 to 1 transmission to the fan shaft. The valves are chain operated and equipped with suitable by-passes, so that by judicious opening and closing of the valves as a whole any one or more of the mixing stacks can be served at any one time. Each valve is equipped with its own motor driven dust extraction fan.

As required, the revived cotton from the





Above: The air stream for the mixing stacks conveyance system is created by two floor-mounted motor driven fans; one mixing stack valve top left. Left: On the ground floor the cotton is chute-fed into a feed hopper aligned with a porcupine opener and a vertical opener (not shown)

mixing stacks is placed in a trough conveyor which feeds the second group of machinery on the floor below. At the delivery end the conveyor end drum is half magnetized for the separation of ferrous matter which, of course, is released on reaching the de-magnetized position of the roller which is correct for collection. When starting up this conveyor an Ellison solenoid automatically passes the transmission belt from a loose to a fast pulley.

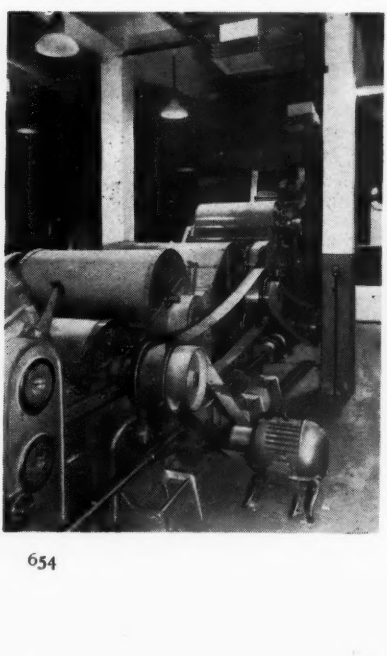
On the ground floor the cotton is first received by a feed hopper which is practically the same as the one upstairs and it then passes on to a porcupine opener and on to a vertical opener. The principle of these machines is the same in that each at the particular stage of the processing furthers the work of loosening, impurity extraction, mixing and evening.

Each of these machines has its own group drive with subsidiary transmissions to conveyors and other components, but in the case of the vertical opener the motor is vertically mounted and there is a horizontal V-belt transmission to the central shaft of the opener. In common with many other motors throughout the plant, each motor is of 3 h.p., mainly we believe as a measure of standardization rather than to meet the precise power requirements of each machine group.

The ground floor feed hopper, porcupine opener and vertical opener are aligned on one side of the room, and the material from the last two units is carried round one end of the room by an air stream to a third feed hopper serving a horizontal opener and a range of perforated cylinders in line with it. The air stream is created by a motor driven fan surmounting the feed hopper, and through a subsidiary transmission the same motor drives a dust extraction fan for the hopper only.

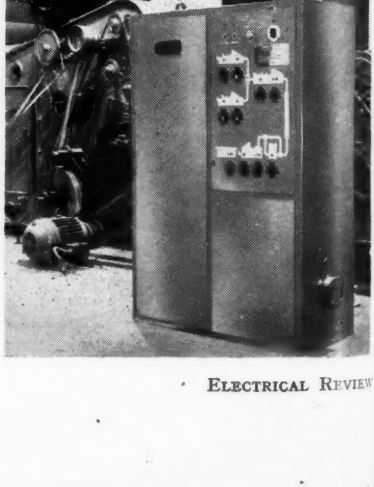
While the work of mixing, cleaning and so on, still goes on in the perforated cylinders the cotton is carried in an air stream and sucked on to the perforated cylinders to form a sheet or the beginnings of the lap. The process is continued through a steel bladed beater which knocks the cotton down on to bars, for the extraction of further impurities. The sheet of cotton, still a conveyed, then passes on to a double distribution chamber which supplies the scutcher machinery in which the lap forming process is continued with further cotton beating and impurity extraction. The cotton is then taken through a series of heavy calender rolls which compress the loosened cotton into a regulated sheet which is then rolled into a lap of predetermined weight and length ready for the carding process with which we are not concerned in this article.

At the delivery end of the perforated cylinders the cotton is picked up for external



Left: Group drive for the comprehensive line of perforated cylinders and feed hopper employing only a 3 h.p. motor

Below: Each major section of the plant is remotely controlled from a central board complete with an indicating schematic operation diagram of the plant



pneumatic handling by an air stream produced by a motor driven fan surmounting the scutcher feed hopper. The fan, the scutcher and the comprehensive group drive for the cylinders and feed hopper line are all 3 h.p. motor driven, and here and there are other mechanical fast and loose pulleys actuated by solenoids.

Each of the main sections of plant, i.e., upstairs and downstairs, is controlled electrically from a central panel, and we need refer only to the ground floor section. On this panel there are master push-buttons for both stop and start operations as well as individual rotary switches for all the essential individual motors. The motors, in turn, are operated by means of contactors.

The panel carries a diagrammatic presentation of the whole ground floor installation and indicator lights show which parts are running and which are not, i.e., the progress of the cotton through the plant. Reading the diagram from the bottom left to right and up to top right and on to top left, the components are, in that order: lattice feed from upstairs, porcupine hopper feeder, porcupine opener, vertical opener, opener cage delivery, horizontal opener, right hand and left hand cage deliveries, and right hand and left hand scutchers.

The Metropolitan-Vickers Electrical Co., Ltd., supplied all the equipment for this control scheme and all the motors throughout the installation. The electrical installation work was carried out by W. A. Smith & Co., Ltd.

We are indebted to Mr. James Taylor, general manager, for permission to view the plant and to publish this article, and to Mr. F. Grundy, works manager, and members of his staff, for assistance in obtaining information and photographs.

Automatic Telephone Exchanges

A Comprehensive Treatise

THE second volume of "Telephony" by J. Atkinson* is devoted to the theory and practice of automatic or machine switching and, together with the first volume, is based on the previous book on the subject by Herbert and Proctor.

The opening chapter deals with elementary principles of automatic switching and is followed by others on traffic and trunking; automatic switching mechanisms; apparatus racks and cabling; impulsing circuits; impulse repetition and regeneration; hunting, testing and switching circuits; holding, speaking and release circuits; supervisory and metering circuits; common circuit elements; typical selector circuits; the non-director system; the director system; the unit automatic exchanges Nos. 12 and 14; intercommunication between automatic and manual exchanges; other step-by-step automatic systems; marker control uniselector systems; power drive systems; relay and crossbar systems; long distance dialling; trunk and toll mechanization; private automatic branch exchanges; miscellaneous facilities; the conversion from manual to automatic working and automatic and semi-automatic power plants.

Each chapter is accompanied by a set of test questions taken from examination papers of the City and Guilds of London Institute. The appendices cover traffic data, useful references to papers on various branches of the subject and answers to numerical questions in the exercises.

The great advantage offered by the method of detached contacts in diagrams is demonstrated very clearly. Without their adoption, some of the diagrams would have had to be presented on large folding sheets. To the designer detached contacts have incalculable advantages, but to the student they present some difficulties. In a complicated set-up it is not easy to remember at any stage what relay contacts are closed or opened, or the sequence of such operations. This could be obviated by a time chart showing at any instant of time the operated contacts and energized relay coils. The student analysing a circuit diagram could then at once see where to start and at any instant the position of affairs would be evident.

This scholarly book, most beautifully illustrated and packed full of authoritative information, is one that no telecommunication engineer can neglect to add to his library. The printing and the reproduction of the diagrams are admirable and the whole appearance of the book is a credit to both author and publisher.—H.H.

* "Telephony," Vol. II, Automatic Exchange Systems. By J. Atkinson, A.M.I.E.E. Pp. 843; figs. 808; index. Sir Isaac Pitman & Sons, Ltd., Parker Street, Kingsway, London, W.C.2, price 50s.

ELECTRICITY SUPPLY

Mobile Service Centres

Increased Charges in S.W. Scotland

A MOBILE service centre is being used by the North Western Electricity Board to serve, temporarily, the town of Littleborough, four miles north-east of Rochdale. It is one of four which are being put into commission for this purpose.

The mobile centre at Littleborough is planned to give as complete an electrical service as possible. Its exterior is constructed in extruded aluminium and, apart from the normal entry door, it has special double doors to facilitate the handling of equipment. Its tasteful interior is veneered in light oak and there are a blue mottled rubber floor and blue and white tapestry curtains. The kitchen units are in cream and eau de nil timber and plastic, and the lighting is by peach fluorescent tubes. A u.d.b. heater is fitted. A specially shaped counter gives maximum efficiency in minimum room. Standard types of domestic equipment are on show and regular demonstrations are being given.

Apparatus Sales in France

Our Paris Correspondent says that complaints are still being made by private concerns that the national electricity organization is competing unfairly in the sale of electrical appliances. It is claimed that the sale of electrical household equipment should be reserved to private firms but that Electricité de France is still selling and installing it. The decree governing sales envisaged friendly agreements between private enterprise and Electricité de France, but there are still, apparently, infringements of this rule. Such agreements are, in practice, difficult to conclude because sellers of electrical apparatus are mostly small firms which have no collective representative organization.

Revised Line Route

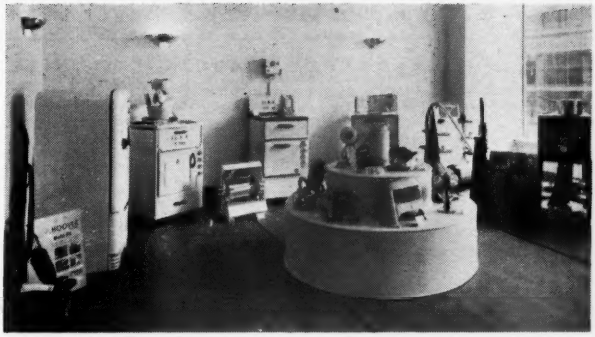
Following opposition from the Stanley (Co. Durham) Urban District Council, the British Electricity Authority has revised its proposal to construct an overhead line on the Greencroft trading estate and near the B.B.C.'s proposed television station at Dipton. The B.E.A.'s new plan avoids the trading estate and is routed farther from the television station.

Orrin Hydro-Electric Scheme

The North of Scotland Hydro-Electric Board published on 16th March the Orrin hydro-electric scheme (Constructional Scheme No. 29) which will develop the water power of the River Orrin in Ross-shire to produce 18,000 kW, with an annual output of 74 million kWh. The Orrin project is the third stage of a group of schemes in the basin of the River Conon which will have six generating stations and seven main dams, the combined capacity being about 107,000 kW with an annual output of about 442 million kWh. The first stage, the Fannich scheme, went into operation in November last and work is just starting on the second stage (the Glascarnoch–Luichart–Torr Achilty scheme).

The estimated cost of the Orrin scheme is £3,500,000 and the proposed works include a

Interior of the North Western Board's mobile service centre



Part of the showroom recently opened in Perth for the North of Scotland Hydro-Electric Board

new loch to be formed in Glen Orrin by the construction of a dam 120ft high and 972ft long across the River Orrin. From the loch water will be taken by a tunnel to the Orrin generating station in Strathconon on the southern shore of the loch to be formed by the Torr Achilty dam. The water discharged from the Orrin power station will be set to work again in passing through the Torr Achilty turbines and a further 5,000,000 kWh per annum will be gained in this way.

New Perth Showroom

In our last issue we reported the opening of the electricity showroom in the Perth city area for the North of Scotland Hydro-Electric Board. The ceremony was attended by housewives from the Perth Corporation's first all-electric houses. In the accompanying picture we show a corner of the showroom.

Scottish Power Plans

Plans to build a new power station in the Alloa–Stirling area, adjacent to the coalfields, and the possibility of a further power station being erected at Blythswood, on Clydeside, were mentioned by Sir John Hacking, deputy chairman (operations), British Electricity Authority, in a letter to the Lord Provost of Glasgow, which was considered recently by the Corporation Special Sub-Committee on Electricity. Sir John, who was reporting on the country's power supply and answering complaints from industry and commerce on load shedding, expressed the view that the power position next winter would be much improved so far as the West of Scotland was concerned.

Coal versus Peat

During the debate on the Electricity Supply (Amendment) Bill in the Northern Ireland Senate Mr. M'Nally pointed out that the proposed electrical development was dependent on coal, with the exception of the Lough Erne scheme. He thought something should be done, as in the South, to utilize the bogs. Replying for the Government, Lieut.-Col. Gordon, the Leader of the House, said that the cost of producing electricity in the Irish Republic was about twice the relative figure in Northern Ireland, notwithstanding the help from water power and peat stations. A committee was going into the question of whether peat was an economic proposition.

S.W. Scotland Tariff Increase

The South West Scotland Electricity Board estimates that during 1951/52 its costs will increase by over £650,000 as a result of the recent increase in the price of coal, a rise in the cost of bulk supplies of electricity, and wage and salary increases. General price increases in various commodities, particularly base metals, still further add to the Board's costs.

About one-third of these additional costs will be recovered from consumers, mainly industrial, who are supplied on tariffs which vary automatically with the price of coal. The Board has decided to increase as from 1st May from ·75d to ·85d/kWh the unit charge in the domestic, farm and commercial tariffs and to increase to ·85d/kWh a few other unit charges which are at present below that figure and which do not vary automatically with the price of coal. It is estimated that in a full year these increased charges will yield about £385,000. The additional revenue required to put the Board in a sound financial position will be obtained by increasing the fixed charge components of industrial and commercial tariffs. The Board proposes to introduce new uniform industrial and commercial tariffs which will be brought into operation later this year. New uniform charges for supplies for public lighting will also be introduced.

The price of the "primary units" in the standard domestic and farm tariffs is not affected nor is it proposed to disturb in the meantime the primary rate of 3d/kWh in the Glasgow domestic tariff. The "off-peak" tariff also remains undisturbed at ·65d kWh.

Street Lighting

South Shields Town Council has been recommended to spend £5,090 on mercury vapour lighting in Prince Edward Road and Prince Edward Road East and £2,475 for similar work in Marsden Road.

NEXT WEEK'S EVENTS

Monday, 2nd April

BIRMINGHAM.—James Watt Memorial Institute, Great Charles Street, 6 p.m. I.E.E. South Midland Centre. "The Determination of Time and Frequency," by H. M. Smith.

BRISTOL.—Electricity House, Colston Avenue, 6 p.m. I.E.E. Western Utilization Group. "The Automatic Control of Lead-Acid-Battery Charging Equipment," by R. A. Harvey.

LEEDS.—Lighting Service Bureau, 24, Aire Street, 7 p.m. I.E.S. Leeds Centre. Annual general meeting.

LONDON.—Savoy Place, W.C.2, 5.30 p.m. I.E.E. Radio Section. "The Automatic Monitoring of Broadcast Programmes," by H. B. Rantzen, F. A. Peachey and C. Gunn-Russell.

MAIDSTONE.—New Inn, Sandling Road, 7.30 p.m. I.E.E. District meeting. Lecture on "Fifty Years' Development in Telephone and Telegraph Transmission in Relation to the Work of Oliver Heaviside," by Dr. W. G. Radley.

NEWCASTLE-ON-TYNE.—King's College, 6 p.m. I.E.E. North-Eastern Radio & Measurements Group. Annual general meeting. Lecture summarizing papers read at the Symposium on "Electrical Meteorological Instruments," by J. F. Coales.

Tuesday, 3rd April

BRISTOL.—Electricity House, 7 p.m. I.E.E. Bristol Students' Section. "Electrical Indication of Mechanical Quantities," by E. L. Harrington.

CAMBRIDGE.—Cambridgeshire Technical College, 6 p.m. I.E.E. Cambridge Radio Group. "A Survey of V.H.F. Communication Development," by J. R. Brinkley.

GLASGOW.—At the Institution of Engineers and Shipbuilders, 39, Elmbank Crescent, 7 p.m. I.E.E. Scottish Centre. "The Design, Specification and Performance of High-Voltage Surge Divertors," by H. F. Jones and C. J. O. Garrard.

LEEDS.—B.E.A. Yorks Division Offices, 1, Whitehall Road, 6.30 p.m. I.E.E. North Midland Centre. "Recent Ideas and Experiments in Magnetism," by Prof. L. F. Bates.

LONDON.—Savoy Place, W.C.2, 5.30 p.m. I.E.E. Measurements Section. "An Electronic Process-Controller," by J. R. Boundy and S. A. Bergen.

At the Institution of Mechanical Engineers, Storey's Gate, S.W.1, 5.30 p.m. Institute of Fuel. Papers on "Underground Gasification," by C. A. Masterman, Dr. E. T. Wilkins and J. L. Elder.

MALVERN.—Winter Gardens, 7 p.m. I.E.E. South Midland Centre, District meeting. Discussion on "The Trend of Design of Television Receivers," to be opened by Dr. A. J. Biggs.

SHEFFIELD.—University, Weston Bank, 6 p.m. I.E.S. Sheffield Centre. "Some Aspects of Illuminating Engineering," by W. R. Stevens, followed by annual general meeting.

Wednesday, 4th April

LONDON.—I.E.E. London Students' Section, 1.45 p.m. Visit to S. Smith & Sons, Ltd., Cricklewood, N.W.2.

At the Institution of Mechanical Engineers, Storey's Gate, S.W.1, 6 p.m. Institution of Heating and Ventilating Engineers. Napier Shaw Premium Paper. "The Sunshine Problem in Air Conditioning," by N. S. Billington.

MANCHESTER.—Engineers' Club, Albert Square, 6.30 p.m. I.E.E. North-Western Radio Group. Discussion on "Electronic Computers," opened by Prof. F. C. Williams.

MIDDLESBROUGH.—Cleveland Scientific and Technical Institute, 6.30 p.m. I.E.E. Tees-side Sub-Centre. Annual general meeting. Address by P. J. Ryle, chairman of the North-Eastern Centre.

NEWCASTLE-ON-TYNE.—Minor Durrant Hall, 6.15 p.m. I.E.S. Newcastle Centre. Annual general meeting.

SHEFFIELD.—City Hall, 7.30 p.m. I.E.E. Sheffield Sub-Centre. Faraday Lecture on "Lamps and Lighting—A Record of Industrial Research," by L. J. Davies.

WEYMOUTH.—Technical College, 6.30 p.m. I.E.E. Southern Centre. "Crystal Diodes," by R. W. Douglas and Dr. E. G. James. "Crystal Triodes," by T. R. Scott.

Thursday, 5th April

CARDIFF.—S. Wales Electricity Board, The Hayes, 5.45 p.m. I.E.S. Cardiff Centre. "Colour and Lighting," by S. A. Wood.

LONDON.—Savoy Place, W.C.2, 5.30 p.m. Institution of Electrical Engineers. "The Development of the Electrical System on the Bristol 'Brabazon' Mark I Aircraft," by M. J. J. Cronin. (Utilization Section paper.)

47, Belgrave Square, S.W.1. Institute of Physics. Education Group. Annual conference (continued on 6th and 7th April).

RUGBY.—E.M.E.B. Showrooms, High Street, 6.30 p.m. I.E.E. Rugby Sub-Centre. Annual general meeting.

Friday, 6th April

BRISTOL.—Grand Hotel, 7 p.m. I.E.S. Bath and Bristol Centre. Presidential address by L. J. Davies, and luncheon.

LONDON.—Connaught Rooms, W.C.2. Electrical Association for Women. Annual conference.

Storey's Gate, S.W.1, 5.30 p.m. Institution of Mechanical Engineers. "Load Distribution in Riveted and Spot-welded Joints," by Dr. D. Williams. "Design Stresses in Fillet Weld Connections," by F. Koenigsberger.

SHEFFIELD.—Royal Victoria Station Hotel, 7.30 p.m. I.E.E. Sheffield Sub-Centre. Annual dinner-dance.

Saturday, 7th April

HUDDERSFIELD.—Y.E.B. Offices, Market Street, 2.30 p.m. I.E.E. North Midland Students' Section. "The Domestic Radio Receiver," by B. S. Dilnot.

Business Efficiency Exhibition

The Business Efficiency Exhibition is to be opened at Olympia, London, on 6th June by the Lord Mayor of London and will continue for ten days.

FINANCIAL SECTION

Company Notes and Stock Exchange Activities

Reports and Dividends

The English Electric Co., Ltd., held its annual meeting on 20th March, Sir George Nelson (chairman), presiding. In presenting the report and accounts Sir George said that the Government had placed substantial orders with the company for defence work; and to ensure that this work did not interfere with their obligations to supply their normal products of capital goods for home and export, they had taken over an additional factory of 1¼ million sq ft which would be integrated with their other manufacturing units in a manner which would cause the minimum of interference with their normal production, while fulfilling the demands made on them for defence work. Sir George referred to the steps taken by the company to meet labour shortages by providing facilities for training skilled craftsmen and by building more than 1,000 houses for their workpeople.

A significant piece of the company's work during the year had been the strengthening of ties with the Commonwealth by the development of overseas factories, the licensing of others to manufacture some of their specialized products, and the carrying out of important contracts for generating equipment and for diesel electric locomotives in those territories. Their efforts to add to their dollar earnings in Canada would be strengthened by the acquisition last year of the majority interest in the John Inglis Co., Toronto, which manufactured heavy engineering products and a variety of consumer goods, and also owned the whole of the shares of the English Electric Co. of Canada. During the year they leased from the Australian Government a factory at Rocklea, near Brisbane. They secured the gold medal at the 1950 Witwatersrand Agricultural Show for their exhibit of industrial electrical equipment made in South Africa. Sir George referred to the outstanding success of their " Canberra " twin-engine jet bomber, which recently made a record Atlantic flight from East to West.

Reviewing some of the more important work carried out by the company, the chairman said that of the steam plant commissioned by the British Electricity Authority in 1950, one quarter of the total was manufactured by the English Electric Co. The total h.p. of steam turbo plant delivered for home and export was twice that of 1949 and ten times that of 1946. Orders received from the B.E.A. included a number of 60,000 kW hydrogen-cooled turbo sets; during the year they had put into commission the first one of this size in this country operating at 3,000 r.p.m. at 1,250 lb/sq in pressure; they had on order a machine for even more onerous steam conditions—namely 1,500 lb/sq in at 1,050 deg. F. An order for a third 60,000 kW hydrogen-cooled turbo set had been received from the Ontario Hydro-Electric Power Commission. Deliveries of hydro-electric sets in 1950 exceeded those of 1949 by 30 per cent, and 75 per cent went overseas. In addition to the four 32,000 kW hydro sets installed at Loch Sloy, the North of Scotland Hydro-Electric Board had ordered a feather propeller turbine operating with 175 ft head, driving a 20,000 kVA alternator. This was the highest head in the world for this type of turbine. In Portugal they had put into operation a vertical reaction set of 57,400 kVA (63,000 h.p.). Their Diesel Engine Division had been active, and engines, including diesel-electric locomotives, had been distributed widely throughout the world.

Orders for electrical equipment associated with the transformation, control, distribution, rectification and use of electricity, were balanced with the very substantial demand for power plant. Similarly, sales and production of domestic apparatus had only been limited by supplies of raw materials. Their total turnover in 1950 was £17 million greater than it was in 1947.

Marconi's Wireless Telegraph Co., Ltd.—In the course of his speech at the annual meeting held on 20th March, Sir George Nelson (chairman), said that the turnover for 1950 showed a satisfactory increase with a corresponding rise in profit from trading, which had been achieved in spite of rising costs and keener competition. In the past year they had achieved sales both for home and export well in excess of any previously recorded. Their exports amounted to nearly half their sales and were directed to eighty different territories, of which many were dollar coutries. The Marconi very-high-high-frequency multi-channel telephone communication system had proved outstandingly successful and orders had already been received from many countries. Two of the transmitters at Wrotham, Kent, together with the associated aerial systems, installed in connection with the v.h.f. broadcasting experiments at present being undertaken by the B.B.C., were designed and installed by their company. In the field of television a complete Marconi television equipment was

manufactured during 1950 for the B.B.C.'s high power northern station at Holme Moss. Their research facilities were being applied to all forms of research and development in radar, navigational aids, television and communication, and to the needs of defence. A large volume of marine apparatus had been produced in their factories during the year.

The Marconi International Marine Communication Co., Ltd.—At the annual meeting held on 20th March, Sir George Nelson (chairman) said that sales of their wide range of apparatus, radio transmitters and receivers, radio telephone sets and radio navigational aids, including Radiolocators, in both foreign and home markets, were well in excess of the figures for the previous year.

The Telegraph Construction & Maintenance Co., Ltd., reports a consolidated trading balance, including other income, for the year ended 31st December last of £391,961, as compared with £361,785 for 1949. The balance of trading of the parent company is £307,408 (against £294,807), which with other income, makes £353,483 (against £335,910). After providing £73,351 for depreciation, £112,326 for taxation, and £6,882 for pensions, there is a net profit of £160,924 (against £140,892), to which is added £63,591 brought in, making £224,515 available. After allocating £106,000 to various reserves, it is proposed to pay a final dividend of 5 per cent, making 10 per cent for the year (same). In addition to the final dividend the directors propose that the special reserve for dividend, set aside in 1949 and amounting to £5,374, being 1 per cent of the issued capital of the company, less tax, shall now be distributed to members. The balance carried forward is £64,777.

In his statement which accompanies the report and accounts Lord Colgrain (chairman) recalls that in his last statement he referred to the lack of home orders for paper insulated power cable and expressed the hope that the Treasury would realize the need to relax its restrictions to allow the natural expansion of electrification. Although this hope was not realized during the year, the results from their Power Cable Department were satisfactory in view of the scarcity of orders. The position has now improved and there are ample orders to enable this department to make a good start in the present year, providing that appropriate quantities of copper and other materials are forthcoming. The Metals Division made an excellent contribution to the trading results and started the new year with a good order book. The rolling mills referred to last year have been operating successfully, but the business which was anticipated has been temporarily stopped due to lack of raw materials. Their High Frequency and Communication Cable Departments have also had a satisfactory year, exports having increased. Their subsidiary, the Selborne Plantation Co., Ltd., in Malaya, has also had a successful year.

With regard to their associated company, Submarine Cables, Ltd., owned equally with Siemens Bros. & Co., Ltd., the amount of submarine cable manufactured in their works during the year was a record, both in volume and value, since the formation of the company in 1935. Nearly 4,000 nautical miles were manufactured, and of this considerable lengths were supplied for the administrations and telegraph companies of different overseas countries including the United States. A large proportion of the output was supplied to home orders of Cable & Wireless, Ltd., the British Post Office and Admiralty. The year was marked by the completion and laying of two high-frequency coaxial cables between Holland and Denmark, each providing 36 speech circuits and improving the telephone link between Scandinavia and Western Europe. Their research engineers have devised special casing and glands to house undersea repeaters and it is expected that in the course of the coming year the first fruits of these researches will be available. The Plastics and Mouldings Department has had an active year. Lord Colgrain refers to the formation of Telcon Telecommunications, Ltd., equally owned by T. C. & M. and Mullard Electronic Products, Ltd.

Aberdare Cables, Ltd., reports a group profit for the year ended 31st October last of £106,200, after deducting taxation of £155,822, as compared with £142,480 for the preceding year. The amount attributable to the parent company is £101,243 (against £134,853). It is proposed to pay a second interim ordinary dividend of 10 per cent, again making 20 per cent for the year. The balance carried forward is £187,391 (against £144,858 brought in).

The Watford Electric & Manufacturing Co., Ltd., reports a trading profit for 1950 of £49,776, as compared with £37,552 for 1949, and a net profit of £22,450 (against £18,803). It is proposed to pay a final dividend of 10 per cent (same), plus a bonus of 10 per cent (against 5 per cent), making 25 per cent for the year (against 20 per cent).

The Brush Electrical Engineering Co., Ltd., reports group trading profits for 1950 of £1,646,070, as compared with £1,307,485 for 1949; new subsidiaries purchased accounted for £314,140 of the 1950 profit. These figures are after providing £568,560 for depreciation and £171,352 for interest paid. Having provided £940,492 for taxation, the group net profit is £667,369 (against £653,878). General reserve receives £417,404. During the year the ordinary stock was increased from £1,600,000 to £2,400,000 by a cash issue. An

interim dividend of 4 per cent (same) has been paid on the increased stock, and it is proposed to pay a final dividend of 6 per cent (same). The balance carried forward is £91,536 (against £54,403 brought in).

The **Greengate & Irwell Rubber Co., Ltd.** reports consolidated trading profits and other income for the year ended 24th December last of £844,869, as compared with £566,039 for the previous year. After deducting £89,852 for depreciation and £391,470 for taxation, and adding a credit balance from subsidiary of £15,040, the parent company's net profit is £359,016 (against £188,600). It is proposed to pay a final ordinary dividend of 1s 3d per 16s share, making 2s 6d per share for the year (same), and a dividend of 3d per 1s share on the deferred (same). After placing £200,000 to stock reserve, and £115,000 for replacement of fixed assets, it is proposed to carry forward £199,233 (against £193,655 brought in).

Joseph Lucas, Ltd., have announced an unchanged interim dividend of 1¾ per cent.

The Nigerian Electricity Supply Corporation, Ltd., has declared an interim dividend of 4 per cent (unchanged).

The Calcutta Tramways Co., Ltd., has declared an interim dividend of 2½ per cent, tax free (unchanged).

New Companies

John V. Barke, Ltd.—Registered 9th March. Capital £3,000. Manufacturers of and dealers in electric lamps, valves, cathode ray tubes, bells, fires, stoves, cookers, etc. Directors: J. V. Barke and F. M. Read. Regd. office: Kaleyards, Frodsham Street, Chester.

Bernard Meggitt, Ltd.—Registered 10th March. Capital £5,000. To acquire the business of an electrical engineer carried on by Bernard Meggitt at Mansfield. Directors: B. Meggitt (managing director), L. B. Pickworth and T. S. Smith. Regd. office: 12, Albert Street, Mansfield, Notts.

Braun (Bletchley), Ltd.—Registered 10th March. Capital £100. Electricians, mechanical engineers and manufacturers, workers of and dealers in electrical apparatus and goods, etc. Directors: C. H. Watson and H. J. Camp. Regd. office: Copthall House, Copthall Avenue, E.C.2.

Henry Eade, Ltd.—Registered 10th March. Capital £1,000. Manufacturers and repairers of and hirers of and dealers in electrical and mechanical apparatus of all kinds, and in particular wireless sets, valves, gramophones, television sets, etc. Directors: J. James, Mrs. Molly J. James and F. Farley. Regd. office: 23, Crendon Street, High Wycombe, Bucks.

John Morris & Sons (Detectors), Ltd.—Registered 15th March. Capital £100. Manufacturers of temperature change detection and fire alarm apparatus and equipment; electrical and mechanical engineers, etc. Directors: J. Morris, jnr., N. D. Gough and C. A. Lingard. Regd. office: Salford Fire Engine Works, Cross Lane, Salford, 5.

J. Sanger & Son, Ltd.—Registered 8th March. Capital £15,000. Electrical wholesale factors, etc. Directors: J. Sanger and H. Sanger. Regd. office: 9, Cobourg Street, Plymouth.

W. J. Evans & Sons (Plaistow), Ltd.—Registered 16th March. Capital £21,000. Manufacturers of and dealers in radio receiving and transmitting apparatus, electronic devices, etc. Directors: Marjorie F. White, H. C. Evans and W. J. Evans. Regd. office: 7, Victoria Street, S.W.1.

Permag Equipment, Ltd.—Registered 16th March. Capital £100. Manufacturers, patentees and licensees of and dealers in magnetting or separating machines, magnets for picking up, holding and clamping, etc. Directors: F. D. Clough and B. J. E. Bruce. Solicitors: Eversheds & Tomkinson, Birmingham.

E. & B. Insulations, Ltd.—Registered 16th March. Capital £2,000. Manufacturers of and dealers in insulating materials and components, plastic mouldings, dynamos, motors, armatures, etc. Directors: N. A. Evans and L. W. Basson. Regd. office: 120, George Street, Croydon.

Eric H. Stow, Ltd.—Registered 15th March. Capital £10,000. Manufacturers and repairers of and wholesale and retail dealers in sound reproducing machines, television apparatus, etc. Directors: E. H. Stow (permanent) and Mrs. Audrey E. Stow. Regd. office: 267, Farnham Road, Slough.

Liquidation

Ernest B. Davis, Ltd.—Winding up voluntarily. Joint liquidators, Mr. L. A. Pardey, of Pardey & Walsh, 65, Gerard Street, Ashton-in-Makerfield, and Mr. S. O. Henry, of Parkin S. Booth & Co., 5, Rumford Place, Liverpool.

Bankruptcies

R. Corbett and **I. A. J. Merritt,** carrying on business as Corbett & Merritt, 2b, Junction Road, Andover, electrical and radio engineers. (Separate application of R. Corbett).—Application for discharge to be heard on 3rd May at the Guildhall, Salisbury.

R. H. Myers, trading as T. Myers & Son at 169, Aston Road, Birmingham, 6, gas and electrical engineer.—First meeting held 29th March. Public examination 10th May at the Court House, Corporation Street, Birmingham.

STOCKS and SHARES

THE first quarter of the year has brought a good deal of business to the Stock Exchange. The activity was certainly unexpected. It owed a good deal of its inspiration to the relaxation of the previous policy of dividend restriction. At the same time, the issue of the Steel stock released a good deal of money, through sales by holders of the stock who reinvested the proceeds into ordinary shares of companies that had been paying dividends well below their earnings: such companies, for instance, as those which have been set out here during the past few weeks. The result has been to weaken the prices of gilt-edged securities, and strengthen those of ordinary shares. Next month, there is, of course, the Budget to contend with; how the Chancellor of the Exchequer proposes to raise the huge sums required for defence and other purposes, is, until 10th April, anybody's guess.

Dividends and Results

Watford Electric 2s ordinary have been a good market at about 7s 3d after the announcement of the final distributions, which raise the total from last year's 20 per cent to 25 per cent, of which 10 per cent is declared as bonus. Trading profit rose by one-third to just under £50,000. Yield on the shares is now £6 18s 0d per cent. Aberdare Cables 5s ordinary have changed hands at around 14s since the preliminary profits statement and the maintenance of the dividend at 20 per cent, on which the shares return rather more than 7 per cent. J. Lucas ordinary, at 35s, were unaffected by the repetition of the interim dividend at 4d per share. The yield is 3¾ per cent on last year's highly conservative total of 6⅔ per cent.

Rising Income

In some of those cases where hopes of better dividends have already been satisfied this year, there has generally been an appropriate response in the price of the shares concerned. Despite this, noteworthy transformations have resulted in the yield basis on which investment can now be made. English Electric ordinary are a case in point since the increase in the dividend from 10 to 15 per cent. After losing part of the initial 10s jump in the price, they now show, at about 60s, the respectable return of close on 5 per cent from a rate of dividend which the company is confident of maintaining, assuming ordinary conditions. A.E.I. ordinary, at 85s, now give nearly 4¾ per cent on the money from the latest distribution of 20 per cent. A number of dividends due in the next few weeks are expected to improve, similarly, the terms of investment.

Market Notes

Brush Electric 5s shares came back a few pence, to 7s, after the appearance of the preliminary profits and dividend statement. The 10 per cent dividend takes £132,000 this time, compared with the £88,000 required to pay the same rate on last year's smaller capital, and is again handsomely covered: more than three times as much is appropriated to reserves. Reliance-Clifton Cables 5s ordinary improved to 26s on the announcement of a second interim payment, making a total of 30 per cent, and a one-for-four scrip bonus in preference shares. Last year's dividend of 16⅔ per cent was equivalent to 25 per cent per annum.

Telegraph Construction

Telegraph Construction and Maintenance fulfilled market expectations in bringing the total dividend for 1950 to 10 per cent, and exceeded them in declaring a further 1 per cent payment from the dividend reserve. At 43s 9d the price of the £1 ordinary shares shows an improvement of about 1s. Allowing for the final distribution in the price, the yield works out at £4 12s 6d per cent on the dividend, or a little over 5 per cent with the addition of the bonus. This declaration restored the dividend to the rate paid without interruption since a year or two before the war, but it applies this time to capital increased by the 25 per cent capital bonus. It is consequently equivalent in practice to a 2 per cent increase on the old rate. Net profits of the group, after tax, improved during 1950 by about 18 per cent to £174,000.

Television Prospects

Both E.M.I. ordinary and Pye deferred are back to about £1, and others in the radio market are generally a little reactionary. No particular concern was evident on the Postmaster-General's decision to postpone, in deference to the defence programme, construction of the five proposed low-power television transmitters, for the completion of the three high-power stations will bring nearly 80 per cent of the population within range. Of more concern was what Mr. Strauss had to say last week about raw material supplies, on which depends the fulfilment of his hopes to see the trade's civilian production continued at the maximum until the placing of Government orders, which are to come as quickly as possible. While recognizing the possibility of an awkward hiatus on that account, market opinion is reasonably sanguine about the outlook for investments in this field.

NEW PATENTS

Electrical Specifications Recently Published

The numbers under which the specifications will be printed and abridged are given in parentheses. Copies of any specification (2s. each) may be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.2.

1947

7[illegible]. Naamlooze Vennootschap Philips' Gloeilampenfabrieken.—Apparatus for winding wire on annular bodies. 18th March, 1947. (653241.)

14847. Budd Co.—Electrical load control system. 5th June, 1947. (653243.)

22276. Philips Electrical, Ltd.—Circuits for amplifying or generating ultra-high-frequency electrical oscillations. 19th August, 1947. (653249.)

25070. Durex Abrasives, Ltd., Fowler, J. W., and Parker, R. A.—Methods of producing sound recording material. 17th August, 1948. (653250.)

27163. British Thomson-Houston Co., Ltd.—Liquid organo-substituted polysiloxanes. 9th October, 1947. (653257.)

27763. Western Electric Co., Inc.—Non-linear electrical condensers and circuits incorporating such condensers. 16th October, 1947. (653259.)

27924. Thornton, A. J. H.—Synchronous alternating current mains clocks. 14th October, 1948. (Cognate application 30503, 18th November, 1947.) (653260.)

29408. Dalin, D.—Heating of feedwater in steam boiler or hot water boiler plants. 4th November, 1947. (653265.)

32761. C. A. Parsons & Co., Ltd., Bowden, A. T., Kolb, P., and Muller, A.—Combustion turbines. 12th January, 1949. (653267.)

1948

971. Compagnie pour la Fabrication des Compteurs et Matériel d'Usines à Gaz.—Television transmitting tubes. 13th January, 1948. (653054.)

1433. Lysholm, A.—Gas turbine power plant. 16th January, 1948. (652991.)

3400. Philips Electrical, Ltd.—Method of manufacturing electric discharge tubes. 5th February, 1948. (652994.)

3759. Radio Corporation of America.—Mounts for electron-discharge devices. 9th February, 1948. (652996.)

3842. Brintons, Ltd., and Lemon, C. G.—High-frequency dielectric heating. 8th February, 1949. (652998.)

4041. British Thomson-Houston Co., Ltd.—Magnetic recording and reproducing systems. 11th February, 1948. (652999.)

4607. Westinghouse Electric International Co.—Balancing machines. 17th February, 1948. (653000.)

4703. Hoover, Ltd.—Suction cleaners. 18th February, 1948. (Cognate application 4704, 8th March, 1947.) (653059.)

5088. Western Electric Co., Inc.—Telephone systems. 20th February, 1948. (653002.)

5312. Schulmerich Electronics, Inc.—Musical instrument. 23rd February, 1948. (Cognate application 5313, 15th January, 1946.) (653171.)

6075. Standard Telephones & Cables, Ltd.—Electric modulators employing electron-discharge tubes. 27th February, 1948. (653062.)

6586. British Thomson-Houston Co., Ltd. and Dudley, N.—Electric winding systems for mines and the like. 24th January, 1949. (653282.)

6787/8. General Electric Co., Ltd., and Rosenbrock, H. H.—Electrical artificial transmission lines. 4th March, 1949. (653005/4.)

8299. Autophon Akt.-Ges.—Devices for phase modulation of electric oscillations. 19th March, 1948. (653009.)

8074. Kula, K. S.—Control systems for electric motor-driven overhead travelling cranes. 18th March, 1948. (653181.)

9659. Naamlooze Vennootschap Philips' Gloeilampenfabrieken.—Dry-shaving apparatus. 6th April, 1948. (653073.)

10535. Pye, Ltd., Edwards, B. J., and Johnstone, D. M.—Photo-electric apparatus for electronic translation of optical images. 22nd June, 1949. (653075.)

11109. British Thomson-Houston Co., Ltd.—Gauging apparatus for lengths of tubing or rod. 22nd April, 1948. (653076.)

11236. British Thomson-Houston Co., Ltd., Maycock, W. H., and Pollard, J. H.—Centrifugally-operated switches for governing internal combustion engines. 2nd March, 1949. (653182.)

11818. Pye, Ltd., and Jackson, D.—Casing or cabinet, particularly for electronic apparatus. 29th April, 1949. (653083.)

14109. Brush Development Co.—Piezo-electric crystal. 25th May, 1948. (653186.)

14450. Standard Telephones & Cables, Ltd.—Selectors for telephone switching and like purposes. 28th May, 1948. (653025.)

14974. Allen, Sons & Co., Ltd., W. H., and Gray, J. H.—Impulse nozzles for fluid pressure turbines. 2nd June, 1949. (653090.)

14997. Clement, G., Vaglio, F., and Carignan, M.—Device for the recording of sound films. 3rd June, 1948. (653189.)

15694. Western Electric Co., Inc.—Cathode-ray devices. 10th June, 1948. (653092.)

15732. Houlding, F. G.—Microphone lift apparatus. 11th July, 1949. (653093.)

15759. Philips Electrical, Ltd.—Radio receiving sets tunable to a plurality of wavelength ranges. 11th June, 1948. (653031.)

15861. Ceskomoravska-Kolben-Danek, Narodni Podnik, and Jansa, F.—Dynamo-voltage control means. 11th June, 1948. (653095.)

16430. Philips Electrical, Ltd.—Circuit arrangements for the transmission of electrical oscillations, and allowing the passage of a broad band of frequencies. 18th June, 1948. (653096.)

16794. British Broadcasting Corporation, Peachey, F. A., and Gunn-Russell, C.—Valve amplifiers. 13th July, 1949. (653099.)

16968. Compagnie de Produits Chimiques et Electrométallurgiques Alais, Froges & Camargue.—Electrolysis cell installations. 24th June, 1948. (Addition to 594724.) (653100.)

17182. British Thomson-Houston Co., Ltd.—Variable-frequency generator. 25th June, 1948. (653101.)

17570. Sperry Products, Inc.—Pulse generating apparatus. 30th June, 1948. (653102.)

18082. Williams & Watson, Ltd., and Wilson, L. B.—Electric resistance welding aluminium and its alloys. 2nd July, 1949. (Cognate application 7281, 17th March, 1949.) (653109.)

18148. Singer, M. J.—Device for illuminating the work area of machines. 6th July, 1948. (653111.)

18230. General Electric Co., Ltd., and Rose, W. R.—Electro-magnetic step-by-step switches. 28th April, 1949. (653112.)

18275. Bylock Electric, Ltd., and Story, A. L.—Vacuum-cleaning apparatus. 8th August, 1949. (653033.)

18540. Metropolitan-Vickers Electrical Co., Ltd., and Scoles, G. J.—Voltage selector circuits. 6th July, 1949. (653116.)

19212. Fletcher, A. H., and Stark, F. H.—Gas-turbine power plants. 16th August, 1949. (653285.)

19248. Prince-Smith & Stells, Ltd., and Feather, E. E.—Electrically-driven centrifugal spinning, twisting and like machines. 19th May, 1949. (653036.)

20050. Compagnie de Pont-a-Mousson.—Joint for protecting underground metal pipes from stray electric currents. 27th July, 1948. (653127.)

21304. General Electric Co., Ltd., and Willoughby, A. H.—Circuit arrangements for operating electric discharge lamps on d.c. 12th August, 1949. (653131.)

21407. Westinghouse Brake & Signal Co., Ltd., Peter, L. H., and Sheppard, E. A.—Illuminated signal devices for railways, and the like. 21st July, 1949. (653133.)

21578. General Electric Co., Ltd., and Rose, W. R.—Electro-magnetic step-by-step switch magnets. 16th August, 1948. (653134.)

21591. Davey, Paxman & Co., Ltd., and Bennett-Powell, J. A.—Means for controlling the load and output of power generating plant. 11th August, 1949. (653040.)

22642. Standard Telephones & Cables, Ltd. (Del Rio, E. P.).—Manufacture of electric cables. 8th July, 1949. (653138.)

23167. General Electric Co., Ltd., Hunt, M. H., and Humphrey, R.—Thermally-operated electric load controlling devices. 2nd September, 1949. (653139.)

23836. Standard Telephones & Cables, Ltd., Starr, A. T., and Grayson, H.—Electric amplifying systems for frequency modulated carrier waves. 10th September, 1948. (653288.)

24340. Brush Development Co.—Piezo-electric transducer and method for producing the same. 16th September, 1948. (653144.)

25012. Philips Electrical, Ltd.—Control devices for electric welders. 24th September, 1948. (653207.)

25434. Watt Gluhlampen-Und Elektrizitäts-Akt.-Ges.—Electric resistance with reinforced ends and methods of producing the same. 29th September, 1948. (653208.)

25506. Drouin, P. A.—Electro-magnetic compass. 30th September, 1948. (653152.)

25514. United Insulator Co., Ltd., Sugden, J. A., and Hiles, E. J.—Ceramic body suitable for use as a dielectric material and the method of manufacture thereof. 29th September, 1949. (653209.)

25607. Western Electric Co., Inc.— Electron-discharge devices. 1st October, 1948. (653153.)

25669. Triggs, W. W. (Pierce Foundation J. B.).—Electrically-driven fluid pumps. 27th July, 1949. (653154.)

26280. Westinghouse Electric International Co.—Gas turbine power plants. 8th October, 1948. (653159.)

27452. Standard Telephones & Cables, Ltd., and Eaglestield, C. C.—Electric pulse code modulation systems of communication. 22nd October, 1948. (653043.)

27728. Power Equipment Co., Ltd., and Heath, B. H.—Time-delay retractive electric switches. 24th October, 1949. (653167.)

28016. British Iron & Steel Research Association, and Bailey, W. H.—Electrical current measuring instruments. 27th October, 1949. (653290.)

28438. Wilson, W. H., and Chinn, A. J.—Electric load levelling devices. 2nd November, 1948. (653044.)

30032. Flory, H. E.—Electric motors. 18th November, 1948. (653218.)

30150. British Thomson-Houston Co., Ltd.—Gear and clutch mechanism for agitator type clothes washing-machines. 19th November, 1948. (653220.)

31289. M-O Valve Co., Ltd., Brook, F., and Kettlewell, E.—Magnetrons. 2nd December, 1949. (653231.)

31513. Vogt, H.—Porous electrode for galvanic accumulator elements, and a method of producing such electrode. 6th December, 1948. (653235.)

32697. Standard Telephones & Cables, Ltd.—Pulse code modulation system. 17th December, 1948. (653298.)

32862. Daphne Investment Trust.—Audio-frequency band filter with adjustable band width. 20th December, 1948. (653301.)

32915. Hamilton, N. H.—Electrical resistance devices. 30th December, 1949. (653049.)

1949

1755. British Thomson-Houston Co., Ltd., and Dudley, N.—Controlling mechanism for winding, hauling and hoisting gear. 24th January, 1949. (Divided out of 653282.) (653305.)

TRADE MARKS

APPLICATIONS have been made for the registration of the following trade marks. Objections may be entered within a month of 14th March:—

RECTAFLEX (design). No. 685,618. Class 9. Electrical apparatus and instruments included in Class 9; scientific, surveying, photographic, cinematographic, optical and measuring apparatus and instruments; and parts and fittings all included in Class 9.—Telemaco Corsi and Emilio Palamidessi, Rome, Italy. Address for service, c/o Marks & Clerk, 57 & 58, Lincoln's Inn Fields, London, W.C.2.

ADMIRAL (design). No. 690,047. Class 9. Apparatus for the reception and transmission of television and sound, and parts included in Class 9 of all such goods.—Admiral Corporation, Chicago, U.S.A. Address for service, c/o Stevens, Langner, Parry & Rollinson, 5-9, Quality Court, Chancery Lane, London, W.C.2.

DIE STIMME SEINES HERRN (design). No. 690,547. Class 9. Apparatus, instruments and devices for the recording, reproduction and transmission of sound; television transmitting and receiving apparatus; and thermionic valves, electronic discharge tubes (not for lighting purposes), sound records, sound boxes for talking machines, gramophone pick-ups, gramophone needles, navigational and signalling apparatus, optical apparatus, electrical measuring apparatus, electric vacuum cleaners, electric dust extractors, floor polishers (domestic) flat irons and kitchen utensils included in Class 9.—The Gramophone Co., Ltd., Blyth Road, Hayes, Middx.

STELLA. No. 619,284. Class 9. Radio, telegraphic, telephonic, television, radiolocation, electronic and sound transmitting, receiving, recording and reproducing and amplifying instruments, all sold complete; and gramophone pick-ups, needles, motors and record-changing apparatus.—Stella Lamp Co., Ltd., 37 & 39, Oxford Street, London, W.1.

FLAG (design). No. B693,021. Class 9. Electrical apparatus and instruments included in Class 9, etc., and parts of and fittings.—John I. Thornycroft & Co., Ltd., Thornycroft House, Smith Square, London, S.W.1.

ENARDE (design). No. 693,374. Class 9. Nucleonic and radiological apparatus and instruments, all included in Class 9.—Nucleonic & Radiological Developments, Ltd., Baltic House, Leadenhall Street, London, E.C.3.

MITEACON. No. 693,537. Class 9. Loudspeakers, sound amplifiers, headphones, microphones, internal communication apparatus and fire alarms, and parts included in Class 9 of all the aforesaid goods. MITEACON. No. 693,538. Class 10. Electro-medical apparatus; and hearing aids for the deaf and parts.—General Acoustics, Ltd., 6-10, Douglas Street, London, S.W.1.

EMICORDA. No. 694,532. Class 9. Apparatus, instruments and devices for the recording of sound.—Electric & Musical Industries, Ltd., Blyth Road, Hayes, Middx.

ETRONIC TELEVISION (design). No. 694,181. Class 9. Wireless and television instruments and apparatus and parts thereof included in Class 9, but not including electric cables or insulated wire or any goods of the same description as electric cables or insulated wire and not including electronic valves or cathode ray tubes.—Hale Electric Co., Ltd., Radio Works, Talbot Road, West Ealing, W.13.

WEGO (design). No. 694,190. Class 9. Electrical condensers.—Wego Condenser Co., Ltd., Bideford Avenue, Perivale, Greenford, Middx.

SERRASOID (design). No. 695,134. Class 9. Modulators (being radio appliances) for sawtooth waves.—Radio Engineering Laboratories, Inc., Long Island City, New York. Address for service, c o F. J. Cleveland & Co., 29, Southampton Buildings, Chancery Lane, W.C.2.

TUVEC. No. 695,349. Class 10. Electric heaters.—Heatovent Electric, Ltd., Lomond Street, Possilpark, Glasgow, N.

CONTRACT INFORMATION

Accepted Tenders and Prospective Electrical Work

CONTRACTS OPEN

Where "Contracts Open" are advertised in our "Official Notices" section, the date of the issue is given in parentheses.

Egypt.—CAIRO.—9th April. Director-General, Cairo Electricity and Gas Administration. Supply of twenty 100 kVA and twenty 125 kVA transformers. (See this issue.)

Portugal.—OPORTO.—4th April. Municipal Gas and Electricity Services. Armoured cable, meters, transformers, switches, etc. (C.R.E. (I.B.) 56436/51. Ten/2247.)*

Sheffield.—3rd April. City Health Committee. One 500 kW rectifier equipment for refuse disposal works. (See 23rd March issue.)

South Africa.—JOHANNESBURG.—18th April. South African Railways. Two electric hoists. (C.R.E. (I.B.) 56437/51. Ten/2245.)*

Uruguay.—MONTEVIDEO.—23rd April. Supply of fittings for public lighting. (C.R.E. (I.B.) 55926/51. Ten/2236.)*

ORDERS PLACED

Carlisle. — Public Lighting Committee. Fluorescent lighting in part of English Street (£1,461).—Revo Electric Co., Ltd.

Durham.—County Council. Tenders accepted for electrical work: Birtley Nursery (£313).—R. Keeler, Chester-le-Street. Stockton Grange estate smallholdings (£284).—Anderson & Son, Middlesbrough. New hostel at Billingham-on-Tees (£968).—G. A. Walton, Blackhill. Cambridge House, Barnard Castle (£320).—Hird & Edkins, Bishop Auckland.

Isle of Ely.—County Education Committee. Electrical installation work at new secondary (modern) school at Whittlesey (£7,762).—Johnson Pearce & Co., Ltd. Installation at new infants' school, Downham Road, Ely (£1,599).—Ely Electrical Co.

County Council Standing Joint Committee. Recommended. Electrical installations in pairs of semi-detached police houses at Lynton Close, Ely (£149), Money Bank, Wisbech (£147), and Mount Pleasant, Wisbech (£147).—W. Palmer & Sons, Ltd.

London.—L.C.C. Installation of electrical fittings, etc., in 124 dwellings on Tobard Garden Estate, Southwark.—Haines & Sheppard, Ltd. Electrical installation at Ravensbourne School, S.E.8.—Bower Engineering Works (Electrical & General), Ltd. Electrical installation at Stowey House open-air school.—John Trapp Electrical, Ltd.

Southport.—Corporation Estates Committee. Recommended. Installation of electricity services in 220 houses on the Central Avenue and Guildford Road estates (£4,780).—Brooks & Southworth.

South Shields.—Tyne Improvement Commission. Transformers and switchgear required for new £1,000,000 ore-discharging quay at Tyne Dock, South Shields.—English Electric Co., Ltd.

CONTRACTS IN PROSPECT

Particulars of new works and building schemes for the use of electrical installation contractors and traders. Publication in this section is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Aberdeen.—Two schools, Cornhill and Cummings Park (£87,377); T. F. Henderson, city surveyor.

Barking.—Additions to factory, Thames Road; Denver Chemical & Metal Refining Co., Ltd.

Bexhill-on-Sea.—Shops, offices, hall, restaurant, etc., Devonshire Road, Marina, Eversley Road site; Montagu Burton, Ltd., Hudson Road Mills, Leeds.

Birmingham.—Scheme for six new branch libraries, Sheldon, Great Barr, Broad Lane, King's Heath, Lea Hall, Quinton, and new California estate; extensions to Silvermere Road Secondary School; H. J. Manzoni, city engineer.

Bootle.—Houses (276), Balliol Road and Merton Road; borough surveyor.

Coventry.—Stoke House Primary School; Garlicks, Ltd., 42, Far Gosford Street.

Dagenham.—Extensions to premises, Freshwater Road; Baird & Tatlock, Ltd., 14, St. Cross Street, London, E.C.1.

Darlington.—Reconstruction of transport depot (£31,000); borough engineer.

Houses (76), Springfield and Lanethorpe Crescent; E. A. Tornbohm, borough architect, Central Buildings.

Houses (14), Haughton South site; Boddy and Bell, builders, Thomas Street. Flats (36); Piggott Bros. and Co., Ltd., builders, Lodge Street.

Denby Dale.—Houses (28). Gilthwaites Lane; T. Potter & Son, Longman Road, Barnsley.

Derby.—Extensions, Nightingale Infants' School; Ford & Weston, Ltd., Derby.

Dewsbury.—Extensions at Ravensthorpe Mills for Carpet Trades, Ltd.; Wallis Gilbert & Partners, London, architects.

Doncaster.—Children's nursery, Stanley House (£35,544); Walter Firth, Ltd., builders.

*Specifications may be inspected at the Commercial Relations and Exports Department, Board of Trade, Thames House North, Millbank, S.W.1 (Victoria 9040).

Felling-on-Tyne. — Factory additions, Abbotsford Road for the Stoneygate Flooring Co., Ltd.; E. M. Lawson, architect, Barras Buildings, Barras Bridge, Newcastle-on-Tyne.

Folkestone.—Development of new estate, Hill Road area, for 300 houses, shops, church, etc.; borough surveyor, Municipal Offices, West Terrace.

Gateshead.—Alterations and additions, Hindley Hall (£49,000); M. S. Failes, Ltd., builders, Coatsworth Road, Gateshead.

Hartlepool. — Houses (51), Annandale Crescent; borough engineer.

Havant.—Fire station; county architect, The Castle, Winchester.

Hayle.—Health centre; S. Gregson, county architect, County Hall, Truro.

Hazel Grove and Bramhall.—Maisonnettes (16), Lumb Lane, for U.D.C.; Vessey Bros. (Contractors), Ltd., Marple, Cheshire.

Hebburn-on-Tyne.—Fitting shop for Hawthorn, Leslie & Co., Ltd. (£40,000); Cargo Fleet Iron Co., Ltd., contractors, Middlesbrough.

Hereford.—Nurses' home at Hereford County Hospital; W. T. Nicholls, Ltd., Churchills Corner, Chase Terrace, Burntwood.

Hoole.—Houses (24), Linden Grove, for U.D.C.; Wm. Browne & Son, 23, Castle Street, Chester.

Hull.—Laboratories, Wassand Street, for Department of Scientific & Industrial Research; Robinson & Sawdon, Ltd., builders, 95, Alexandra Road.

Ilford.—Flats (72), Billet Road; borough surveyor.

Kingston-on-Thames.—Block of offices, 17/19, Clarence Street; Brewer, Smith & Brewer, architects, 11, The Green, Richmond, Surrey.

Leamington Spa.—Houses (80), Whitnash estate; H. Fedeski, architect, 28, The Parade.

Leeds.—Houses (150) and 80 flats, Belle Isle and Seacroft sites (£289,032); N. B. Bell & Co., Ltd., builders, Frankland Terrace.

London. — Lewisham. — Factory, Dalmain Road; Chamberlain Industries, Staffa Road, E.10.

Luton.—Extensions to factory, Dallow Road; Adamant Engineering Co., Ltd.

Macclesfield.—Houses (23), Weston; Hugh Owen, Ltd., 431, Buxton Road, Great Moor, Stockport.

Maidstone.—Scheme for development of site near Loose Road for county fire headquarters, fire station, training school, staff houses, etc.; Kent county architect, Springfield.

Manchester.—Extensions to St. Clare's R.C. School; Pochins (Contractors), Ltd., King Street, Middlewich.

Office block, Bradford Colliery, for N.C.B.; G. & J. Seddon, Ltd., Manchester Road, Farnworth.

Oldbury.—Dwellings (72), Titford estate; T. Dunkley Hogg, architect, 1, Church Street.

Oxford.—Extensions to medical block, Wingfield Morris Orthopædic Hospital; Fielding, Dodd & Stevens, architects, 21, Turl Street.

Plymouth.—Four-storey building, Millbay Road and Phœnix Street; Services & Co., Ltd., Teats Hill, Cattedown Road.

Pontyclun.—Buildings adjacent to Hensol Castle Mental Deficiency Institution; Ivor Jones & John Bishop, architects, St. John's Square, Cardiff.

Preston.—Extensions to Springfields Factory, Salwick; Wm. Eaves & Co., Ltd., Daggers Hall Works, Vicarage Lane, Blackpool.

Richmond (Yorks).—Houses and flats, Westfield South site; F. Shepherd & Son, Ltd., Blue Bridge Lane, York.

St. Helens.—Dwellings (102), Broad Lane, Carr Mill, and six shops with eight maisonnettes over, Moss Bank; M. Ward, borough surveyor, Town Hall.

Salford.—Flats (40), Prestwich; J. Gouldman, Sons & Co., Ltd., Park Road, Crumpsall.

Flats, Bury Street (24) and Cumberland Street (21); Unit Construction Co., Ltd., Knutsford, Cheshire.

Scarborough.—Restaurants at Eastborough and Sandside; G. Whipp, architect, 15, Valley Bridge Parade.

Seaton Valley. — Houses (46), Seghill Station, for U.D.C.; T. W. Burgess, surveyor.

Sheffield.—Staff houses (32) adjoining Saxondale Hospital; E. F. Wilson, architect to Regional Hospital Board, Fulwood House, Old Fulwood Road, Sheffield.

Premises, Shepherd Street; Kandies (Sheffield), Ltd., 663, Chesterfield Road.

Secondary modern school, Richmond; Hadfield, Cawkwell & Davidson, architects, 279, Glossop Road.

Shrewsbury. — Home for old people (£26,642); W. Higley & Son, builders, 8, Pride Hill Chambers.

Southport.—Day nursery at St. Andrew's Field, between Talbot and Park Streets; H. L. Bunting, borough engineer.

South Shields.—Additions to boys' high school (£109,000); Henderson Brothers, builders, Smith Street, Tyne Dock, South Shields.

Stourport-on-Severn. — Houses (35), Walshes Farm scheme No. 5; Godwin, Clist & Greenway, architects to U.D.C., Bank Buildings, Kidderminster.

Stretford.—Three blocks of flats, Christie Road site; Humphrey Park Estates, Ltd., Humphrey Lane, Urmston. Two blocks; C. H. Godfrey & Son, Ltd., Bowling Road, Manchester. Two blocks; Lionel Gray (1933), Ltd., Hospital Road, Farnworth.

Surbiton.—Flats (144), Chessington Court estate; Culpin & Son, architects, 3, Southampton Place, W.C.1.

Towcester.—Houses (38), No. 3 site, for R.D.C.; Clements Bros. (Northampton), Ltd., 64, St. Andrew's Street, Northampton.

Walsall.—New factory premises; Bright Brazing, Ltd., Bott Lane.

West Bromwich.—Offices, stores and warehouse; Hampson Industries Ltd., 96, Arthur Street.